
Identifying Key Factors Affecting Success in International Food Product Markets

The contribution of migration and tourism to international food product trade,
a model for modern international food consumption, and
results from a comparative survey of international food product marketers from Germany and Australia

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Ziel dieser Studie ist eine Analyse der Globalisierung von Lebensmittelmärkten am Ende des 20. Jahrhunderts. Die Arbeit ist in zwei Hauptteile gegliedert: Der erste analysiert internationale Lebensmittelmärkte auf der aggregierten Ebene und der zweite Teil handelt vom internationalen Lebensmittelhandelsmanagement auf der Firmenebene. Der internationale Handel mit verbrauchernahen, verarbeiteten Agrarprodukten ist heutzutage das hauptsächliche Wachstumssegment im weltweiten Agrarhandel, aber es existiert kaum ein geschlossenes theoretisches Rahmenwerk, um diese Art von Handel umfassend zu erklären. Die Studie stellt vorhandene Theorien dar und ergänzt sie mit einem neuen Erklärungsansatz: Der Beitrag von Immigration und internationalem Tourismus zum internationalen Lebensmittelhandel. Hierzu wird die deutsche Importnachfrage von verschiedenen verarbeiteten Agrarprodukten aus verschiedenen Herkunftsländern anhand eines ökonometrischen Fehlerkorrekturmodells geschätzt. Die Ergebnisse zeigen, dass Immigration nach Deutschland und Tourismusaktivitäten von Deutschen in die Herkunftsländer der importierten Waren im Zeitraum 1967 bis 1990 tatsächlich zur Erklärung der Importströme beigetragen haben. In einem weiteren Abschnitt der Studie wird ein algebraisches Modell für den modernen, internationalen Lebensmittelkonsum vorgestellt, welches als dynamisches Nutzenakkumulations-Modell spezifiziert ist, in Gegensatz zum statischen Budgetallokations-Ansatz der herkömmlichen mikro-ökonomischen Verbrauchstheorie. Mit diesem Modell lassen sich zum Beispiel die Konvergenz des Lebensmittelverbrauchs in verschiedenen Ländern oder Erfolgsfaktoren in der internationalen Lebensmittelvermarktung erklären. Der zweite große Teil der Studie präsentiert Ergebnisse einer Unternehmensumfrage von internationalen Lebensmittelvermarktern aus Deutschland und Australien. Die Umfragen wurden 1998 (Deutschland) und 1999 (Australien) durchgeführt. Die Ergebnisse der Umfragen, welche auf einer Stichprobengröße von 166 beruhen, zeigen, dass die Aus- und Weiterbildung des Personals und die Beherrschung der internationalen Handelslogistik bedeutend für den Erfolg in internationalen Lebensmittelmärkten sind.

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EXECUTIVE SUMMARY

Key words:

International trade, food products, food industry, immigration, tourism, error-correction models, international management, Germany, Australia, cluster analysis, factor analysis, discriminant analysis.

This study explores globalisation of food and drink product markets at the end of the millennium. It is divided into two main parts: the first analyses international food product markets at the aggregate level, and the other deals with the management of international food product trade at the company level. International trade in consumer-oriented food and drink items is today the main driver of worldwide agricultural trade, however no complete theoretical framework exists to explain this kind of trade. This study reviews existing theories and complements them with a new approach of explaining international trade of food and drink products: the contribution of immigration and tourism in international food product trade. Moreover, a model of modern international food consumption is presented, specified as a dynamic utility accumulation model, as opposed to the static budget allocation approach of tradition microeconomic consumption theory. Finally, results from a survey of German and Australian international food product marketers are presented, which show that staff education/training and logistics are crucial for the success in international food product markets.

The non-homogenous good food can be categorised into seven sub-groups, which may be quite different with regard to the nature of the international trade and investment patterns that occur in these product groups: (i) *undifferentiated agricultural commodities* which are generally price sensitive and bulky; (ii) *fresh perishable foods* which are difficult to transport, but thanks to improved logistics, international trade in these products has been growing rapidly, (iii) *processed foods* which through technological manipulation are products either made edible through the separation of edible and non-edible parts, or which are altered in texture, taste, shelf-life, etc., and where international trade of these products has often only been made possible through a prolonged product life as a result of processing; (iv) *manufactured foods*, as a preparation or mix of different ingredients, and where the way these foods are prepared or the particular combination of ingredients may in many cases be "culturally-bound", thus putting potential restrictions on the international marketability of these foods; (v) *industrially produced food products* (or consumer-packaged foods) which in general cannot be produced in household kitchens, for which branding is very important, and which very often may be designed from the very start by large international food and drink corporations to be sold globally. Furthermore, there are also the concepts of (vi) *high-value foods*, which are characterised by higher selling price levels and higher income elasticities of demand than the average basic foods, and (vii) *high value-added foods*, where value-adding very often may go hand in hand with higher degrees of processing, but sometimes branding alone can already increase the market value of a food product considerably. This study deals with globalisation in consumer-oriented food and drink product markets only, i.e. international trade in undifferentiated agricultural commodities is not treated.

World trade in consumer-oriented food and drink products has grown significantly during the last decades. In addition, trade in these products now represent the largest part of the value of global agricultural shipments, thus making that trade in bulk agricultural commodities can no longer be taken as a valid indicator for the world's total agricultural trade. *The European Union* is the most significant supplier of these food products, with France, the Netherlands, Germany, the UK, and Italy all being among the eight leading export nations of consumer-oriented food in 1996. If some basic agricultural commodities and tobacco products are also included, the US was the largest food exporter in that year. However, in using a more suitable aggregation, which includes processed foods, beverages and fats only, France and the Netherlands end up far ahead of the US. In net exports and per capita terms, the Netherlands seems the most competitive consumer-oriented food exporting nation, followed by France and Australia. The export structure of leading food product trading nations reveals that diversity, i.e. non-specialisation in only one or two food categories, seems important for gaining a leadership position. *The most important consumer-oriented food and drink products* that were exported worldwide in 1994-95 were meat, followed by alcoholic beverages, and fruit and vegetables. Fish and fish preparations were the products in which developing countries hold the highest shares in world exports. The products with the highest annual growth rates, apart from shell fish fresh, frozen, are all highly processed, such as food and cereal preparations, non-alcoholic beverages, and chocolate and sugar products. *Intra-industry trade*, i.e. the simultaneous exchange of similar goods between two countries, made up almost half of the trade of the European Union in food and beverages in the early 1990s. Belgium, Germany, the Netherlands, and France traded even more than 50% of their food and drink products in the intra-industry type of trade. Between the US and the EU, intra-industry trade was especially important in food preparations, fresh meat, breakfast cereals, and canned fruit and vegetables, whereas for wines, soft drinks, pasta, cheese, and snack foods trade was mainly of the inter-industry type. However, these trade patterns depend on the countries or trade blocs between which products are exchanged rather than on the products themselves. This can be explained with the existence of high transport costs which may act as a significant barrier to very long-distance trade in many products and thus resulting in the fact that most processed food trade is of an intra-regional nature (e.g. EU, NAFTA, East Asia). *Prospects for future trade* in consumer-oriented, processed and high-value foods are positive. World food demand is expected to rise with a further growing world population and the likely increase in real incomes for most of the world population supports the shift to more processed and value-added foods. Comprehensive quantitative studies support this view in predicting strong growth in trade in processed food.

Foreign direct investments in food industries have expanded strongly during the past and, as a result, today's foreign affiliate sales worldwide exceed processed food exports by about a factor of 5. However, not in all countries is FDI equally important: it is mainly found in a few, mainly Anglo-American, nations. Nevertheless, in recent years, France and the Netherlands in particular have emerged as new and increasingly important foreign food industry investors. Moreover, recent data suggest that FDI in the food industry, although in absolute terms strongly growing, has relatively grown slower than the total FDI average. Also, globally, only a few — western — countries are the main food industry investors, and these countries were able to increase their significance even more during 1988 to 1997. And, most of the food industry's investments go to developed countries, thus leaving developing countries — similar to the international trade situation — more and more behind.

Benefits from international trade in food products that arise are — apart from the general gains from trade such as increases in consumption possibilities and in production efficiency due to specialisation — also specific to this particular market. These special benefits, however, may be largest for consumers who gain through a greater variety of available food products and, very often, through cheaper prices. For producers, welfare gains from trade liberalisation are not guaranteed. On the one hand they can gain access to foreign markets, but on the other hand, there is also the risk that producers may lose domestic customers to foreign competitors. This is especially true in the food product markets of industrialised economies where food consumption has become mostly income inelastic. Markets are saturated because consumers are not hungry anymore and thus, with stagnating population growth, total demand for calories has stopped to increase. As a consequence, for every foreign food product that comes on a domestic market, a local product may not be sold. Thus, inefficient producers may be driven out of the market as a result of increased competition due to international trade. Finally, society as a whole may gain when peoples move closer together as a result of international trade in food products, which, very often, can be seen as culturally-bound goods. With each foreign food product that domestic consumers start to appreciate (e.g. Italian pasta or French wine), mutual understanding may grow and thus risk of conflict might be reduced.

Traditional trade theory is mainly preoccupied with production side determinants of international trade and examines how economies actually *should* trade in order to render the global economy efficient. However, it is also the most developed theoretical framework which is in particular useful for analysing issues of trade policy and welfare implications of international trade. Traditional trade theory is based on the assumption that countries are *different* in production technology (Ricardo case), or in factor endowments such as human, physical, and financial resources, and the opportunity cost of using these factors to produce (and to market) several goods (Heckscher-Ohlin case). These differences then give rise to *comparative advantages* in production which are seen as *the* cause of why goods are exported (or at least why they should be exported). In particular, the Heckscher-Ohlin theorem states that a country will export the commodity whose production uses the factor intensively with which a nation is relatively abundantly endowed. One might argue that food processing or manufacturing, as opposed to agricultural production which is dependent on arable land resources and on suitable climate, is a comparatively basic industrial activity which does not in any case depend on a country's resources (take the production of chocolate as an example) and therefore in which it is difficult to imagine that a single country could develop a strong comparative production advantage. This is even the more so, since food manufacturing is (1) a necessary human activity which in general has always been located near where people work and live, and (2) it is also a culturally influenced activity, i.e. the way food products are produced and distributed can be important for local people. That is, very often not only production efficiency counts but also local traditions and cultural aspects of food manufacturing. Therefore, it should be clear that standard trade theory may not be able to provide a complete understanding of what actually happens in international food product markets. However, this theory may be helpful to understand trade in non-differentiated raw products such as *agricultural commodities*. In addition, the theory may also be appropriate when applied to the existing inter-industry kind of trade in high-value foods such as — typically unbranded — fresh fruit and vegetable, fresh meat and fish or oils and fats. Furthermore, comparative cost advantage in production may be important for intermediate products which are used as inputs for further processing/manufacturing in the food industries and where price may be the most important purchasing factor. For the trade of highly differentiated

consumer food products, however, "world market prices" may not be the major determinant, since non-price factors such as quality aspects, brand image, pre- and after sales customer service, etc. have become more and more important. Here another approach is needed to explain existing trade pattern, in particular as traditional trade theory cannot explain intra-industry trade, but which accounts nowadays for the largest part in industrialised countries' food product trade.

New trade theory has been developed to explain the phenomena of *intra-industry trade* which can theoretically and empirically be shown as occurring mostly between industrialised nations that are *similar* in their income levels and their factor endowments. The driving forces behind this kind of trade are seen in (1) economies of scale in production which allow to minimise per unit production cost by expanding into foreign markets, and (2) product differentiation, as it is assumed that consumers in general gain utility from higher levels of product variety. For aggregated global food industries it has been shown empirically that in particular similar per capita income levels and short transport distances, together with the integration into a free trade area or a common free market promote intra-industry trade, with the last factor confirming that international food product trade is mostly of intra-regional character. At the level of individual food industries, however, these few common factors are not enough to explain the causes for intra-industry trade. Here it has been empirically demonstrated that industry-specific and related factors are necessary to gain a better understanding of what determines intra-industry trade in food products. For example, the extent of EU intra-industry trade in dairy products is influenced by producer and retailer concentration, economies of scales in production and the availability of raw milk. In general, however, intra-industry trade may also be very much a statistical phenomenon with the extent of this kind of trade increasing the more aggregated the analysed trade flows are, and with seasonal effects (harvesting times) causing biases. Thus, even though the concept of intra-industry trade is a very useful one that expands the understanding of international trade considerably, it must also — especially in the food industries — be taken with some caution. This is even the more so, since between similar countries the level and pattern of intra-food industry trade can differ considerably and one would like to know what driving forces stand behind this.

National competitive advantages were stressed by PORTER (1990/98), who argued that factors of production in today's internationally integrated economies are increasingly mobile, i.e. in case of a lack they can be acquired from the world market. That is, he sees factor endowments not as "God-given" and unchangeable but as *manageable* in the sense that they are only one input-variable among others, which are important in order to gain international competitiveness, defined as profitability of industries operating in international markets. Moreover, there are "factor creation mechanisms" especially for the development and application of knowledge and intellectual skills which PORTER sees as the real crucial input factors in modern manufacturing industries. Empirical findings underline the importance of human capital even in the in general relatively "low-tech" food industries. The second argument which PORTER put forward is that in international markets, individual companies compete rather than nations. Thus, although a country may have a comparative advantage in the production of a certain commodity, we know that in reality within the same industry there are in general competitive companies and non-competitive ones. That is, a comparative advantage in production resulting from relative factor endowments does not necessarily lead to competitive advantages for every company. There is a whole set of conditions that must be fulfilled in order to gain success in international markets, such as factor and demand conditions, company strategy and market structure, supporting industries, and government and chance. Thus, national export performance

must be seen as a multidimensional concept with *all* determinants being important, and not only factor endowments or technical features of production such as economies of scale. Criticism of PORTER's theory may be related to the whole concept of competitiveness. It is a term under which different people understand different things, i.e. the term is not defined exactly or in a widely accepted way. In particular PORTER's approach to define competitiveness in relationship with export performance seems not to be free of problems. There may be industries that are perfectly competitive in terms of profits, market shares and employment levels in their home markets but which simply do not engage in foreign business activity. Furthermore, for some industries it may be easier to enter foreign markets than for others. Food products may belong to the latter group, as these goods are often difficult to transport and also they may be culturally-bound products made for local preferences and consumption habits. Finally, it seems that the whole theory applies best to the Anglo-American way of doing business, i.e. within large companies that are listed on stock markets and managed by highly trained professionals. We know however, that — apart from a few well-known global players — food manufacturers are typically small or medium-sized. Very often they may be family owned and typically run by the owner who as "hands on" in the production process and who's company operates mostly in local markets. Therefore, PORTER's strategic management theory for globally operating industries may only be partly applicable to the large numbers of locally orientated and small-scale food businesses.

The role of foreign demand and the contribution of international migration and tourism to international trade in food products, as two factors which potentially influence the (trans-) formation of tastes in a country, was theoretically and empirically analysed. Although traditional trade theory has generally focused more on supply side explanations for the causes of international trade, demand side conditions may be more important for the strongly growing international trade in food and drink products. If it is assumed that tastes of (at least some) immigrants are biased versus their source countries' food products and that travellers to foreign countries may (at least in some cases) develop a taste for the food products of their favourite holiday destinations, then there should be a positive connection between international migration and tourism activities and international trade flows of (at least some) food products. For immigration, there are, in theory, two effects on food product imports from the source countries of the migrants: (1) with rising immigrant levels in a country (which are assumed to lead to an increase in total population), the total demand for food will rise — and given the assumed bias in the tastes of the immigrants versus their source countries' food products — the share of imported food products in totally consumed food will rise, too. (2) More immigrants in an economy may also lead to an increase of e.g. ethnic restaurants, speciality shops, stalls on local food produce markets, ethnic cuisine product lines in supermarket shelves. The food products supplied via these new channels are likely to be also consumed (at least to some extent) by the local (home) population. As the total amount of food consumed in today's affluent societies may be seen as fixed, these new ethnic food products will therefore substitute locally produced food. As a consequence, the share of imported food products in totally consumed food rises, too. Thus, immigrant groups may be seen as catalysts for the change in tastes in the home population. Increased international tourism activities may be seen as another factor that may alter the existing tastes of the home population. Here, international travel may lead to more contact with new and exotic food products. If it is assumed that at least some of the tourists wish to consume — back in their home countries — (at least some of) the products that they have experienced in their favourite holiday destinations, then similarly to the second effect of migration above, there may be a positive connection between rising levels of

international tourism and rising shares of foreign food products (i.e. rising levels of imports) in the total consumption of food products. These theoretical hypotheses have been tested empirically for the case of Germany during the period from 1967-90. In order to control for trends that are commonly present in time series data and thus to avoid the problem of spurious correlation, an error-correction model approach has been used. The empirical results are, as so often in this kind of research, not indisputable. However, for German aggregate food imports from India, Thailand, China, and Turkey, and for imports of wine, cheese, and processed/preserved vegetables from France and Italy, it may be concluded that migration to Germany and international travel activities of Germans to these destinations have indeed contributed to rising food product imports from these countries. The tourism elasticities for individual food products have been found to lie between one and two, and — consistent with a priori expectations — they are below unity for aggregate food imports from the analysed Asian countries. As expected, the estimates of the immigration elasticities were found to be higher than those for international tourism activities. In some cases, as for imports of drink wine from France, and of cheese and processing wine from Italy, they have been estimated as being well above two. These findings may thus complement the other theories of international trade in food products presented before. Perhaps these demand side effects may describe better the driving forces that stand behind the rising levels of international trade in food products, at least for those culturally-bound ones, which are mostly produced by small and medium-sized food manufacturers.

The explanation of foreign direct investments is rooted in the process of allocating existing global capital stocks efficiently among countries, i.e. in a way that the marginal returns on investments equalise in each country. The location of food processing companies can generally be seen as resulting from a decision between producing near input markets, i.e. in the countryside near agricultural production, or near to output markets, i.e. near the cities and close to consumers. This trade-off problem is part of a wider discussion about where production in general is most efficient, with the general rule being that considering transport costs for inputs and for final products and economies of scale and scope, production should take place where unit costs for the whole production and marketing process are minimised for a individual company or a whole industry. FDI decisions generally may follow this economic reasoning, but for an individual company other aspects such as communication costs, costs of stationing personnel abroad, barriers due to language, customs, taxation, and protection of intellectual capital can also matter. DUNNING's (1988) OLI framework argues that for an individual company there must be organisational, locational and internalisational advantages the sum of which must outweigh the additional costs and risks of setting up of a production or marketing facility in a foreign country. Empirical findings have shown that these advantages are highest in companies with important "knowledge capital", i.e. intangible, company-specific assets, such as high R&D inputs, special brand reputation, and important marketing budgets. In the food industries it has been found that R&D seems to be less important as a determinant for FDI decisions, but marketing expenses do matter, as does company size, i.e. large corporations are more likely to invest directly. Most food businesses are however small or medium-sized. Concerning the question, whether FDI is a substitute or a complement for exports, the findings do rather suggest the former. However, for an individual company both strategies can be profitable options, depending on the circumstances. Finally, in reality food manufacturers may not be as "footloose" as other industries. In Europe (above all in Mediterranean countries), and for a number of traditional food products, legislation exists that regulates the location where food manufacturing must take place. Special labels, such as "Protected Denomination of Origin" and "Protected Geographical Indication" have been put into place for this purpose. In Anglo-

American countries, in the contrary, consumer nationalism — i.e. the patriotic willingness to purchase a domestic product — are a big issue in food purchasing decisions, and which encourage food manufacturers to produce in the own country. These restrictions need to be considered when FDI in the food industries is discussed. It seems therefore, FDI may only be a real option for large food manufacturers of industrially produced and culturally-unbound food products. For the majority of locally operating, small and medium-sized food businesses, exports seems to be the first and maybe only choice for doing business in foreign markets.

An international comparison of food and beverage industries of the EU-15, the US, Germany and Australia reveals that in Europe this economic activity takes place in comparatively small production plants and that its value-adding is considerably lower than in the US. The Australian food and beverage industries lie in between these two extremes. When food and beverage manufacturing is compared to the all manufacturing average — as measured by employee per company and turnover per company ratios — it becomes clear that food and beverage plants in the EU-15 are usually smaller than average manufacturing plants, but in the US they are larger than this benchmark. In all three continents turnover per employee is usually higher than the all manufacturing average, implying higher labour productivity levels. On the other hand, gross profits, i.e. the value-added, are in all three continents considerably lower as compared to the all manufacturing figure. *Total factor productivity* in food processing has been growing only slowly and is falling from year to year thus confirming that it is a comparatively mature economic activity. Food and drink manufacturing also seems to be more capital-intensive than other manufacturing industries, but this may depend on the actual sub-industry considered. *Economies of size* are in general small in food and drink manufacturing, but they are more important in capital-intensive sub-sectors and for larger companies which are able to spread their large marketing/advertising budgets over more units and thus achieve lower total unit costs. *The cost structure* of food and drink manufacturing may indeed be particular as compared to other (manufacturing) industries. Variable costs seem to be smaller in food and drink manufacturing, as profits are generally higher and there is no reason to assume that fixed costs are significantly larger. Sunk costs, too seem to be smaller, as R&D investments are lower, despite high marketing spending. However, not all money spent on advertising or R&D is potentially lost: some of it increases a company's intangible capital, thus raising its market value. On the other hand, it appears that marketing efforts become more efficient with larger company sizes, as advertising costs can be spread over more output units, thus reducing unit total cost. In addition, advertising seems also to become more effective from a certain level on. Therefore, even if sunk costs may not be significantly higher than in other industries, the need to reach a critical mass — i.e. a minimum company size — for marketing reasons may still create considerable barriers to entry to food and drink markets, and may help to explain the existence of very large international consumer food product companies. Transaction costs in food and drink manufacturing, finally, may be structurally higher than in most other industries, given the perishable character of most food products, and the 'natural' risk involved in their production. With respect to international trade it becomes clear that even despite an above average profit potential, comparatively high barriers to entry and transaction costs can lead to food and drink manufacturing in general being less attractive for internationalisation activities than other industries.

Data on the world's 50 leading food and drink manufacturing corporations confirm the industry level findings that Anglo-American companies in this sector are larger-scale and more profitable than the ones from other countries. However, within the sample of 50 companies, no statistically significant relationship between company size, the share of foreign sales in total turnover, the share of food/drink sales in total turnover, and the operating profit level could be found. At the same time, the data reveal that German food manufacturers are hardly present among the world's 50 top companies. An analysis of data on the export performance of German food and beverage industries during 1967 to 1999 shows that companies in these industries have displayed much higher export growth rates than the all manufacturing average, albeit starting from a much lower basis. Thus, even if German food and beverage manufacturing companies are hardly present among the world's leading companies, in particular consumer-oriented German food industries' export performance has grown fast during the last 32 years. The data confirm once again that the real growth in international agricultural trade is within manufactured consumer food products.

Two categories of barriers to the international trade of food and drink products exist: (1) trade policy related barriers, such as tariffs or quotas, etc. may be seen of becoming less important, due to international efforts of reducing such barriers. More market distorting than tariffs on the finished food/drink product may actually be levies on agricultural inputs, which may affect the cost competitiveness and output levels of food industries. Another problem with consumer food products is that they are often targeted in trade related retaliation actions. (2) process and product standards, such as Technical Barriers to Trade or Sanitary and Phytosanitary Standards seem to be the emerging issues in the discussion on barriers to the international trade in food/drink products. Although these issues are regulated by international trade agreements, the often nationalistic or regionalistic nature of these standards cause them to be effective trade barriers. In the future, producers of food and drink items may be faced with more and more complicated product and process standards, which may be seen as today's real obstacles to the successful international marketing of these products.

Aggregate food consumption has been shown to converge in many industrialised countries, implying that diets are becoming increasingly similar. Yet, at the same time, it has also been shown that strong regional food consumption patterns persist. This apparent contradiction can be explained in two ways: (1) a large part of consumers in a country eat increasingly internationally similar diets, whereas the other parts of a national population continue to consume traditional food. This view is supported by the empirical finding that similar types of food consumers across countries exist which — to very different degrees — accept new foods and new food consumption habits. (2) Another possible explanation for increasingly similar diets is that most consumers of a country adopt new foods and eating habits, but only on certain occasions, whereas at other times they still prefer their regional foods. In order to gain deeper insights in these developments, and to see how these trends affect international food product marketers, a better understanding of consumption behaviour is needed.

Traditional microeconomic consumption theory describes how rational consumers should allocate their expenditures between goods in order to reach a utility maximum. In assuming income as the actual binding limiting factor in consumers' choice, the optimum condition then proposes to choose the quantities of two goods in a way that, at the margin, their utility/price ratios equal each other. *LANCASTER's consumption theory* argues that product characteristics spend utility, rather than market

goods. In order to maximise utility, a consumer selects a specific bundle of market goods in a way that allows him to consume her/his preferred combination of characteristics. Given the conventional budget constraint, consumption will then be efficient when a consumer chooses the cheapest of — otherwise identical — such bundles. This model expands the traditional approach of modelling the consumer's decision making process to the world of differentiated goods. *Household production theory* incorporates time in the consumer's decision problem. It argues that (non-market) Z-goods are the real utility-spending entities. These Z-goods need to be produced by the households, using market goods and time for the transformation process. Thus, a budget and a time constraint need to be considered by a consumer when selecting goods in order to maximise utility. Both constraints can however be transformed into a single one, using a consumer's wage rate. This wage rate enables the calculation of a shadow price for the time requirements in the production of a Z-good. The optimum condition then implies to equalise the ratio of the marginal utility of two Z-goods to the ratio of their marginal costs, however, the latter supplemented by the shadow prices of their production times.

A dynamic concept of utility derived from food consumption over a longer-run period can be specified in assuming that utility from different characteristics is accumulated over time. There is a base utility from calorie intake, which is equally important to all consumers as it assures human life. Other part utility may come from other characteristics of food consumption, such as its taste, health, status or environment contents. These attributes may not be equally important for all consumers, but if they matter they increase the particular consumer's overall utility. There are, however, also utility-decreasing characteristics that come along with food consumption. Modern food consumers may want to keep a certain body weight, thus the calorie contents of food constrains their food choices. In addition, food consumption takes time and money, and — by choice or out of necessity — many consumers may want to limit the total amount of time and money spent on eating and accompanying activities. All of these constraints have certain time frames. Food needs to be eaten regularly, thus calorie intake must take place within short periods. Taste or health proprieties of food may also be desired by many people to be consumed on a regular basis. Status aspects or environmental concerns may perhaps not be important at every meal, but over a certain period there may exist — individually different — minimum consumption requirements. Another important aspect in food consumption is that food is usually consumed as meals, i.e. as bundles of many different foods and drinks. This implies that utility affecting characteristics offered by a meal come in fixed proportions. Although the characteristics, and their amounts, offered by a meal should objectively be the same for all consumers, personal preferences, which are affected by gender, age, culture, income, social status, etc. lead to the objective vector of characteristics being transformed (by a weighting procedure) into an individual one. Yet even then the different characteristics will come in fixed proportions which makes utility maximisation difficult since it causes trade-off problems. Thus, in the long run, a consumer will choose food products which allow him best to maximise his aggregate utility, in accumulating as much as part utility as possible, until the first binding constraint (maximum calorie intake, monetary expenses or time requirements) is reached. The different time frames of the constraints allow for some choice between individual meals as not all restrictions need to be met at any meal. However, subsequent food choices may then be affected by the food chosen before. The better the combination of foods chosen over a period, i.e. a diet composed of meals that offer much of utility-increasing characteristics relative to the most restrictive utility-decreasing one, the higher the overall utility will be at the end of the period. The more relevant the characteristics which affect the decision process the more difficult the food selection process will be.

Implications that arise from this theoretical framework are: (1) converging international food consumption can be explained as a reaction to increasingly similar social and economic environments in many countries; (2) individual preferences may be homogenous within geographical areas but different across them which causes regional food consumption patterns to continue to exist despite international pressures for more similar eating habits; (3) inter-regionally different preference matrices of consumers make it difficult to market regional dishes successfully internationally; (4) internationally successful dishes and food products are those that offer a high content of one or two distinctive utility-increasing characteristics relative to a relevant, i.e. binding, utility-decreasing characteristic, which may be price, time requirements or calorie contents; (5) foreign food products are more easily accepted by a local population when they help to transform already existing and well-appreciated food products into a new meal which offers a better mix of utility-increasing characteristics. For food product marketers it is important to understand these implications if they want to operate successfully in international food product markets in the 21st century. *The practical relevance* of the presented model is that it can be made operational. Using e.g. conjoint analysis — a multivariate statistical technique — it is possible to determine the content of product (or meal) specific relevant characteristics as the mean values of survey results from a large number of consumers. Consumer individual deviations from these mean values would then reflect individual preferences. Regionally similar patterns of deviations from the aggregate mean would indicate area-specific food consumption preferences. Knowledge of these area-specific preferences and of the characteristics contents of a product or a dish should then allow for accurate predictions of the marketability of a food product in a foreign market.

As general conclusions it becomes clear that international trade in food and drink products is complex in nature and thus the application of one single theoretical framework which would be able to explain this kind of trade is difficult. Rather, depending on the nature or kind of the food product, different concepts need to be applied. Overall, however, since food and drink items are consumer products, it seems clear that this kind of international trade is explained best from the consumers' point of view, rather than from the production side on which standard international trade theory is usually based.

The management of international marketing activities of food and drink products is characterised by particular complexities that are caused, in theory, by higher transaction costs and risks involved as compared to home market deals. Transaction costs are higher due to the generally greater physical distance to the foreign market and the thus resulting greater transport, communication, negotiation, etc. efforts necessary for business success. Transaction risks are usually greater, since more "uncontrollable factors" exist in foreign markets than in the home market, thus making the successful completion of a foreign business deal less likely.

Concrete problem areas which food product exporters face have been identified by analysing several empirical studies dealing with this topic. The six problem areas which seem to be most relevant are: (i) *education and training of export staff* (including foreign language skills and knowledge of foreign business partner's mentality); (ii) *trade fair activities*; (iii) *special food product logistics and marketing problems*; (iv) *trade terms, export documentation and billing, and foreign exchange risks*; (v) *provision of foreign market information*; and (vi) *government assistance*.

A survey of international food product marketers from Germany and Australia was conducted in order to find answers to the question of which factors affect success in international food product markets. Out of 1 298 companies that were contacted in November 1998 (Germany) and July 1999 (Australia), 166 usable questionnaires were obtained. The responses were analysed separately for the overall sample, German and Australian companies, all manufacturers and traders, and for manufacturers and traders alone from each country. Given the small sample relative to the sector sizes, the representativeness and generaliseability of the survey findings may be seen as low, however, from a statistical point of view, $n=166$ is large enough to achieve statistical significance, especially if the investigated effects can be assumed to be structural for the food and drink product sector and independent of the country or of business class.

Multivariate analysis techniques have been used to analyse the survey data and to identify the key factors that affect success in international food product markets of the sample companies. Apart from tests for differences in group means (t - and F -tests, non-parametric tests, and chi-square tests), cluster analysis, factor analysis, and multiple discriminant analysis have been employed. Factor analysis can be used to condense the information contained in a large number of variables, which are bundled into a smaller set of factors representing underlying dimensions. Cluster analysis' primary purpose is to group objects based on the characteristics they possess in a way that the resulting clusters exhibit high internal (within-cluster) homogeneity and high external (between-cluster) heterogeneity. Thus, factor analysis condenses variables into a few factors and cluster analysis classifies objects into a few groups. Both techniques allow for the identification and description of structures in complex data. Multiple discriminant analysis, on the other hand, is a dependence technique which can be applied in situations where a relationship should be predicted or explained which affect the category in which an object is located. It aims to identify variables that are suitable for predicting the group membership of an object and provides measures to describe the relative importance of independent variables in this procedure, and the discriminatory power of the estimated function as a whole.

General company characteristics, in the survey results, show that German companies, in general, are larger, older, more productive, they are more often publicly listed, they tend to be importers (in particular traders), they operate mostly in European markets, and they are less consumer-oriented than Australian businesses. Moreover, German responses reflect attitudes from functional (i.e. export or sales) managers. The responses of Australian companies, on the other hand, express a more general management background (i.e. managing directors, or CEOs). Australian companies have their main foreign markets in Asia. The main structural differences between manufacturers and traders are, that manufacturers generally seem to have higher corporate ages, they are larger in size, and they are more export-oriented than traders.

Foreign business performance or 'success' is complex to measure, since this concept is multidimensional in nature. Nevertheless, the survey results suggest that trading companies start significantly faster with foreign business activities than manufacturing companies, but that German manufacturers are even significantly slower than Australian ones. German companies (and in particular traders) are more import-oriented, whereas Australian businesses are more oriented towards exporting. There is no statistically significant difference in the past growth rates between German and Australian companies, but the latter rate their current and medium-term future business development tendencies significantly more positively.

Foreign business qualification findings show that German companies have relatively fewer staff dealing with foreign business activities. In both countries about 40% of these employees hold a university degree, which is most likely a business/economics one. Furthermore, about 40% of the companies have never used any sort of further specialised job training for their employees, but if they do, German companies generally tend to choose private institutions, whereas Australian companies rely more on government programs. Employees who deal with foreign customers/suppliers in Germany know significantly more foreign languages and master these significantly better than employees in Australian companies. On the other hand, Australian companies rank the critical importance of foreign language skills higher than German ones, despite the fact that English may be the most important business language in the world. The importance of the knowledge of foreign business partners' mentality is rated by Australian companies significantly higher than by German companies, although there does not seem to be a great difference in the knowledge level between the two countries. This may be caused by the fact that Australian companies do most of their foreign business in Asian countries, i.e. in a, in general, culturally different environment. Between the two business classes, there are no major structural differences, apart from the fact that traders seem to rank the knowledge their employees have about their foreign business partners' mentality significantly higher than manufacturers do. However, this finding may be due to the fact that sample trading companies are more involved in foreign business than manufacturers and therefore they have more contact to foreign customers or suppliers.

Trade fair activity findings reveal that the only significant difference between German and Australian companies is the higher participation rates at trade fairs of the former. Moreover, German companies exhibit strongly in the home country, whereas Australian ones hardly exhibit in Australia. The most important purpose of trade fairs in both countries is the 'making, keeping or improving of contacts'. There is no major difference concerning trade fair expenses and staff use, however significantly fewer Australian companies prefer individual stands than German companies. The general difference between manufacturers and traders is that the former mostly take part in trade fairs as exhibitors, whereas traders are mostly visitors. Manufacturers spend more on trade fairs, employ less staff, and receive more financial grants for participation from governments.

Food product-related questions reveal that the survey companies operate in several product groups and processing/packaging categories which highlights the fact that the sample represents well the diversities of the two countries' food manufacturing sectors. The degree of logistical problems is ranked by all companies as relatively important, however it seems that Australian companies depend more on appropriate transport logistics in their foreign partner countries than German companies, probably mostly because they operate in the quite different Asian markets. This fact may also be a reason why Australian companies have a higher percentage of product losses in their foreign business activities. Moreover, Australian companies face a stronger seasonal influence in their foreign sales. Australian companies highlight the origin of their food products more than German companies, which on the other hand adapt their recipes more to their foreign markets. For German companies statistical reporting is more troublesome than for their Australian counterparts. The main differences between manufacturers and traders is that the former have fewer product losses in their foreign business transactions, but on the other hand manufacturers are more affected than traders by the complexities resulting from different national food

laws. Overall, it becomes clear that logistical problems can be seen as a significant obstacle for foreign business activities.

Trade and payment terms-related questions reveal that German companies appear to have more bargaining power, since they seem to better transfer better the transport cost and risks to their customers. On the other hand, German companies use more risky payment forms than their Australian counterparts. Other standardised international contract standards are also used more often by German companies, but a further standardisation does not seem to be a major preoccupation for the vast majority of the sample companies. The most frequently used currency is the home currency in both countries, but in general, exchange rate risks do not seem to have a great influence on international business decisions. Finally, Australian companies may have a better understanding of, and therefore have higher usage rates of, professional exchange rate risk management tools. There are no major differences between manufacturers and traders, which might have been predicted beforehand, since the use of international trade, payment and contract terms, and of exchange rate risk management techniques should be independent of the business class.

Foreign market information seem to be better available in German companies which use mostly (semi-)public marketing agencies as information sources, whereas Australian companies prefer government agencies. Australian companies use modern electronic information media more intensively and they rate the critical importance of a better supply of foreign market information higher than German companies. There is no major difference between manufacturers and traders.

Government assistance, in form of financial grants, is received more often by Australian companies than by German ones, and by manufacturers more often than by traders. The assistance provided by (semi-)public marketing agencies or commodity marketing boards seems not to have a great importance, nor is more assistance of this kind desired by the sample companies. The sort of government assistance mostly asked for by the sample companies are more financial grants for trade fairs and travelling, the creation of foreign customer contacts, and the reduction/abolishment of administrative formalities and tariffs.

An overall comparative assessment of the different variables makes clear that the biggest obstacle for food companies engaged in international food marketing activities lies in the *actual knowledge of how to enter and to serve a foreign market effectively* (how to avoid customs troubles, how to adapt to foreign food legislation, and how to obtain crucial foreign market intelligence), followed by *staff qualification* (appropriate training and foreign language skills), and the mastering of *logistics* (the knowledge of the particularities of the food product, and the availability of suitable facilities). The distance to a foreign market either geographically or in terms of the existence of a similar consumption environment as in the home market seem to matter least as success factors. The big difference between German and Australian companies is that for the former staff qualification belongs to the most crucial points, whereas for the latter logistics aspects are more important. Moreover, exchange rate risks are much more important for Australian companies, indicating that they do not enjoy the advantage of doing most of their business in a fixed exchange rate environment. For traders, staff qualification questions and logistics are most important and significantly more crucial than for manufacturers. Manufacturers, on the other hand, care most about trade

administrative problems and foreign business partners' mentality. Trade fair activities seem to be only of some importance for German manufacturers and the assistance through either governments or (semi-)public marketing agencies or commodity marketing boards is rated as not being crucial for companies operating in international food product markets.

The relationship between foreign business performance and success factors was explored in identifying three clusters of companies which are distinct in their foreign performance pattern measured by four different variables. Cluster 1 may be called *most foreign business oriented but mature* and is characterised by the highest level of expanding speed into foreign markets, high foreign business shares, but low growth rates and development tendencies. Cluster 2 companies are *late but successful movers*, characterised by low expanding speed levels, average foreign trade shares, but comparative high growth rates and development tendencies. Cluster 3 may be given the name *low involved but high potential*, since these companies have the lowest foreign trade shares but the highest development tendencies, with average expanding speed and growth rates. Multiple discriminant analysis was used to identify those factors which affect success in international food product markets and which are rated significantly differently among the three clusters. The results consistently show that statistically significant differences exist only between cluster 1 and the two other clusters but not between cluster 2 and cluster 3. Overall, the *logistics factor* and the *staff education/training factor* discriminate between cluster 1 and the other two clusters, with cluster 1 companies rating the importance of these factors higher than the companies belonging to cluster 2 or 3. German cluster 1 companies rate the importance of staff education/training statistically significantly higher than cluster 2 or 3 companies. The importance of trade fair activities and public support is, on the other hand, rated as less important by the more successful German companies than by the less successful ones. Australian cluster 1 companies, too rate staff training/education, including the knowledge of foreign language skills and of foreign business partner's mentality, as more important than the companies from the other two clusters.

In summary, the survey results suggest that staff education/training and logistics are the most important factors affecting success in international food product markets. Another main finding of the survey is that problems which occur in the international food business do not depend much on business class – i.e. there are no main differences between manufacturers and traders. Even the differences between Australian and German companies are comparatively small. Thus, the findings may reflect the structural problems that are involved in the international food product business. Also, even though the sample size of the survey is small relative to the industry, the results often show statistical significance. Practical significance can also be seen as high, too, since most findings are in line with previous expectations.

Implications for agribusiness managers which arise from this study are therefore that staff qualification matters strongly when operating in foreign markets and every possible care should be undertaken by companies to recruit well-trained staff and to offer export managers appropriate additional training whenever possible. This finding thus confirms what should be obvious: at the very heart of competitiveness stands the human being with his/her skills to create value, however new and unfamiliar the environment encountered. Recruiting and maintaining well-trained staff is therefore crucial even for food companies which are generally considered as low-tech and low-skill. A second important implication for food businesses arises from the fact that the ability to manage logistics (i.e. to market perishable products over

long distances) indeed discriminates between more and less successful enterprises. Knowing the product and its technical characteristics, for example in terms of how product quality is affected by long distance transport, thus allows export managers to plan better and to execute expansion into remote international markets. Of course, this may be more relevant for some food businesses than for others but delivering acceptable product quality in a continuous way matters to all of them.

Future research should focus on a more detailed analysis of which skills employees precisely need to increase their food companies' competitiveness in foreign markets. Some aspects have already been explored, such as language skills and the knowledge of foreign business partners' mentality. There are other issues which could also be crucial, e.g. negotiation skills. Moreover, future studies should investigate in more detail the logistics problems that are involved in the international food product business, given the lack of literature dealing specifically with this topic, and acknowledging the findings of this survey that logistics turned out to be a major success factor in international food product markets. In a time where (national) manufacturers and retailers forge ever closer alliances in order to master the supply chain as effectively as possible, it is clear that the next stage will be the international one. Thus, future studies must investigate how transport, storage and information exchange – across climate and time zones, with (multiple) border crossings and between (often) different national retailing standards – can be facilitated and optimised.

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Identifying Key Factors Affecting Success in International Food Product Markets

1 INTRODUCTION

Globalisation was one of the hot topics in the last decade of the millennium. Driven by new technologies, cheaper transportation costs, and international liberalisation agreements, global trade, foreign investments, and international travel have grown strongly. Nowadays, many consumers almost all over the world enjoy the availability of useful products manufactured in foreign countries, of spending their holidays abroad, or of having instant access to almost "real-time" information from anywhere around the globe. Undoubtedly, there are many benefits resulting from an ever closer economic and political integration of the world's nations. In fact, those who in general gain most from globalisation are consumers (The Economist, September 29 2001), as they gain access to cheaper goods and services. This study deals with the globalisation of one of the most important consumer goods industries: food and drink manufacturing.

The world food market makes no exception to the general trend of globalisation, and today most of the value and growth of international food trade is within processed/manufactured or high-value food and drink products. This means that international trade in agricultural commodities, once the largest part in world food trade — and analysed intensively during the last decades — is becoming relatively less and less important. However, despite the change in the nature of international food trade, little innovation has occurred in the theories which were developed to explain international trade and which deal mainly with undifferentiated, price-sensitive commodity-like goods. Although modern theories of trade in manufactured goods do exist — namely the new trade theory of intra-industry trade — food and drink items seem to fit uncomfortably into this framework, developed mainly for industrial products in industries where significant economies of scale are present. And, although some useful elements in all the existing theories can be found, few studies so far has tried to create a coherent theoretical framework of international trade of food products, taking into account that there are different categories of food and drink products which may have different driving forces underlying the global exchange of these goods.

The management of international trade in food products at the company level is a similar topic which is not covered extensively in the literature. Although plenty of research work on general export management has been done, hardly any of it deals with the particularities of the foreign trade of food and drink products. So far, not very much is known on what impact product-specific factors, such as e.g. the perishability of food products or the unstable supply of agricultural inputs, have on the international marketability of food and drink products. That these aspects have not been researched more intensively is even more surprising as it is known that food and drink industries in general have lower export shares than other manufacturing industries. Other aspects in this respect seem also interesting, e.g. what effect on a food company's foreign performance have the education and job training of employees responsible for foreign trade, the role of logistics, or the use of internationally standardised trade and payment terms.

This study reviews existing theories of international trade and adapts them to the trade of food products. Moreover, these theories are supplemented with an approach to incorporate the effects of international migration and tourism on the trade flows of food and drink products "which are minefields of cultural as well as economic sensitivities" (Financial Times, September 19 2001, p.I). For this, a theoretical framework is provided and empirical estimates for the case of Germany are presented, using an econometric error-correction estimation model. Also, foreign direct investments in the food industries will be discussed. As it seems clear that the understanding of international consumer behaviour is crucial for the international

marketability of food and drink items, a new approach to model modern international food consumption is presented. In contrast to the traditional static microeconomic budget allocation model, a dynamic utility accumulation model will be introduced. Although there is probably still much scope for improvement of this new model, some valuable conclusions can already be drawn from it. Finally, the management of international trade in food products at the company level will be discussed. A theoretical analysis is followed by an empirical questionnaire survey of international food product marketers from Germany and Australia ($n=166$). In using factor, cluster, and multiple discriminant analysis, key factors for the success in international food product markets will be identified and discussed.

The structure of this study is as follows: the second part after the introduction analyses international food product markets at the aggregate level. Within that chapter, different classification systems for food products will firstly be discussed. Then the significance of international trade in these products and of foreign direct investment in the food industries will be described by presenting some recent data. The next section reviews existing theories of international trade and complements them with a theoretical and empirical analysis of the effects of international migration and tourism on the international trade in food and drink products. In order to better see that traditional trade theories cannot explain in a completely satisfying way all international trade in differentiated consumer food and drink items, a discussion on the economic structure of the international food industry, and on the determinants of modern international food consumption is provided. The chapter finishes with some conclusions drawn from this analysis at the aggregate level. The second part examines the management of international food and drink product trade at the company level. First, the theory of this kind of trade management will be discussed. Then empirical results from a survey of international food and drink product marketers from Germany and Australia will be presented. As before, the second part finishes with some important conclusions. The Appendix includes all raw data used, the algebraic foundations of econometric error-correction model, the results from the regression analysis, and the English version of the questionnaire used in the survey of German and Australian companies.

2 ANALYSING INTERNATIONAL FOOD PRODUCT MARKETS AT THE AGGREGATE LEVEL: PRODUCT CONSIDERATIONS, TRADE AND INVESTMENT DIMENSIONS, AND PRODUCTION AND CONSUMPTION DETERMINANTS

This chapter of the study analyses the international food product markets at the aggregate level, i.e. data and analysis will be provided for food and drink industries, international trade flows, and national food and drink consumption. First, different classification systems for food and drink products will be discussed. Then data on global trade in consumer food and drink products and on foreign direct investments in the food and drink industries will be presented. The next sub-section reviews existing theories of international trade and adapts them to trade in consumer food and drink products. As these theories cannot explain all trade in these products in a completely satisfying way, a new approach to explain international trade in culturally-bound food and drink products will be presented. A general theoretical framework and an empirical investigation for the case of Germany, using econometric error-correction models will be provided. The next sub-section discusses the economic structure of the international food and drink industry, and presents recent structural data for food and drink industries in different western countries. As it will become clear, food and drink manufacturing/processing is in many ways different to other manufacturing activities. Following that comes a detailed discussion on international food consumption in the 21st century. In this section a model of modern international food consumption will be presented, specified as a dynamic utility-accumulation model in contrast to the conventional static budget-allocation/utility-maximisation approach of microeconomic consumer theory. Finally, some important chapter conclusions will be given.

2.1 Non-homogeneous good food

The non-homogenous good food can be categorised into (i) *agricultural raw commodities*, (ii) *fresh perishable products*, (iii) *processed foods*, (iv) *manufactured foods*, (v) *industrial food products* (or *consumer-packaged foods*), (vi) *high-value foods* and (vii) *high value-added foods*. In the literature, the groups (ii) through (vii) are often referred to as 'processed foods' only. This simplification may be handy, however there seem to be some differences with regard to the causes and consequences of the international trade within the individual food groups. Distinctions between the above categories have a technological or an economic dimension. Technologically, different degrees of processing transform a raw commodity into a new product which may have completely different characteristics, such as looks, taste, texture, smell, shelf-life, etc. Economically, processing does not only alter the product itself, but in general it also raises its market value. However, high degrees of processing do not always increase the market value of a food product. In some cases high-value foods are not processed at all, such as e.g. fresh exotic fruit, or some seafoods, etc. (OECD 1997, BIE 1996). Also, differences between the above categories can be fluent. Sometimes one product can be a commodity and at the same time it can be marketed as a highly differentiated consumer food product. For example, butter can be used as an industrial input for e.g. a biscuit factory or it is sold as e.g. a high quality Irish brand product for final consumer use.

The analysis of trade patterns and the understanding of the different driving forces that underlie those patterns is facilitated by a classification of food into different categories. Although trade economists in general do not recognise the importance of product characteristics when analysing international flow of goods, agribusiness professionals and agricultural marketing specialists do so. The latter have focused their attention on individual commodity systems which may involve the production, processing, and marketing of either only a single commodity or a set of very closely related foods (such as dairy products, poultry, citrus fruits, etc.) (JAFTE & GORDON 1993, p.7). Therefore, different categorisations for food will be presented in the following, which will then be used — after a general discussion of relevant trade and investment theories — for the creation of a more specific explanation framework of international trade in food products.

2.1.1 *Technological classifications*

Technological classifications are based on common features that are derived mainly from product characteristics such as processing stage, shelf-life, purity, quality, taste, etc. Even if these features are usually not considered in economic trade analysis, they are often most important for the international marketability of food products.

2.1.1.1 Agricultural commodities or primary products

Agricultural commodities or primary products are basic foods such as grains and rice, live animals, oilseeds, raw coffee, tea or cocoa. These products need at least one further stage of processing in order to be transformed into an edible product. They are in general bulky, perishable, and expensive to transport. Therefore the nature of the foreign trade of those primary products is quite different from the international marketing of processed, manufactured or industrially produced foods (PADBERG 1997; SHELDON & ABBOTT 1996).

2.1.1.2 Perishable product distribution

Perishable or fresh food products such as fruit, vegetables, fish, meat cuts, etc. are sold for direct consumption and in general they do not undergo any kind of processing in the sense of product transformation. However, these products may need chilling and/or packaging (SCHAFFNER *et al.* 1998). Improved storage and transport techniques and technologies, such as e.g. low temperature and controlled atmosphere storage¹, and the increased use of refrigerated ships (which today run 20% to 30% faster in comparison to the 1970s), have contributed substantially to an increase in the world wide trade of fresh fruit and vegetables (OECD 1996). Moreover, although in general the transport of perishable foods over long distances carries potential food safety risks, as food spoilage is positively correlated with prolonged delivery times (PAWSEY 1995), the rapid expansion of air freight capacities has made fast delivery possible almost all

¹ The controlled atmosphere method is a much recent storage technique which only was introduced into maritime transport at around 1980. It consists of placing fruit in an atmosphere in which the oxygen, nitrogen and carbon dioxide content, temperature and humidity are maintained at a level which slows the metabolism of the fruit and the ethylene given off by them is absorbed if necessary (OECD 1996).

over the world (RIRDC 1994). Also, unit costs of air freight have fallen by 3%-4% per year during the last 10-15 years (WTO 1998, p.35). As a consequence, the international trade in perishable food products has grown strongly all over the world (HENDERSON *et al.* 1996a).

2.1.1.3 Primary and secondary food processing

Historically, the development of techniques and technologies of making food durable and transportable was a precondition for expanding international trade in food products. Food preservation techniques have transformed perishable animal and vegetable products into edible, stable, and portable products, thus making it possible for them to be put in long-term storage and to be transported (THOMPSON & COWAN 1995). Furthermore, THOMPSON & COWAN (1995, p.23) give also a good overview on the historical development of food preservation techniques:

Preservation of foods inhibits spoilage caused by bacterial growth, oxidation, insects, or desiccation. Fermentation, oil packing, pickling, salting, and smoking are all ancient preservation technologies. Milling and baking, brewing, and cheese and yoghurt making are ancient methods of food preservation and also extend the durability of foods. Refrigeration in caves or under cool water were also well-known ancient techniques of food preservation. Most other methods of preservation are innovations of the past 200 years. Mechanical refrigeration, various dehydration techniques, and quick freezing were late nineteenth- and early twentieth-century discoveries.

Today, commercial food processing is defined as "the branch of manufacturing that starts with raw animal, vegetable, or marine materials, and which transforms them into intermediate foodstuffs or edible products through the application of labour, machinery, energy, and scientific knowledge" (CONNOR & SCHICK 1997, p.XXII). Thus, food processors fulfil the economic task of converting various food materials into finished, consumer-ready products and add value by technological transformation, packaging, physical storage, delivery, and information (*ibid.*).

Technologically, depending on the degree of transformation from a primary good into a product ready for final consumption, one can differentiate between primary and secondary processing (SCHAFFNER *et al.* 1998). *Primary processing* is the first step of transforming a bulk raw commodity into an edible product and/or the process of separating edible parts from non-edible ones (skins, bones, straw, stones, etc.). This may result in fresh or frozen fish fillets, in meat cuts, cleaned grains (polished rice), raw sugar, roasted coffee or fermented tea leaves, etc. *Secondary processing* involves a further step, where the character (texture, smell, taste, etc.) of a food is altered. Cream, butter or cheese are quite distinctive from milk in texture or taste, as mince is from meat, and flour or flakes are from grains. Canned or frozen fruits and vegetables, fruit juice or wine are further examples.

2.1.1.4 Manufactured foods and industrial food products

Manufactured foods and drinks are goods such as bakery products (bread, cakes, biscuits, buns, etc.), sausages, pies and pastries, tinned soups and frozen meals, beer, etc. That is, they are all products which are or could be produced at home, but which nowadays in general are bought in food shops and supermarkets. These products typically consists of a blend of different food ingredients (SCHAFFNER *et al.* 1998, p.9).

Industrial food and drink products (or consumer-packaged food and drink items) are modern goods that can only be produced in industrial food plants. Chocolate², candy and confectionery products, chewing gum, soft drinks, soup powder and stock cubes, ready-to-eat breakfast cereals, instant coffee powder, but also flavourings and colours, extracts, artificial sweeteners and fat substitutes belong to this group. These products are sometimes called "formulated products" by food technologists. Besides, the creation of completely new "food structures", and thus the development of product innovations, has only been possible through the use of a wide variety of modern chemicals, such as emulsifiers, stabilisers, and other texture-modifying substances (SCHAFFNER *et al.* 1998).

The difference between manufactured and industrial foods is that the former have often been a result of history and tradition and they are thus "culturally-bound products" (CARTER 1997, pp.8-9). For example, there may be recipes for soups all over the world, but the ingredients and the way the dishes are prepared can differ completely. The same may be true for breads, cheeses, sausages, biscuits, etc. which has strong implications for the international marketing of these products. Industrial food products, on the other hand, very often have not this traditional feature in their product characteristics. On the contrary, often these products might even have been designed to be globally marketable, for which traditional roots or cultural preferences may be an obstacle.

2.1.2 Economic classifications

Economic concepts are based on the (relative) market prices or mark-ups of different food categories. Time series analysis of own prices can be used to determine whether a product is an easily substitutable commodity or is sufficiently differentiated, i.e. whether it holds a unique market position. High-value foods are characterised by higher and more stable world market prices and higher income and price elasticities, whereas high value-added products are those where the difference between selling price and input material costs are large, i.e. those products with high gross margins.

2.1.2.1 Defining a commodity

A commodity test based on time series econometrics was proposed by GORDON *et al.* (1999). The authors claim that commodities are "simply goods produced under conditions described by the perfect competition model of economists" (p.4). In order to test for this they check whether similar products have co-integrated³ price series or not. A commodity is defined as a good which has one or more close substitutes whose prices develop in the long run not independently from its own price. Economic forces from either the supply side (e.g. an increase in production of the good) or the demand side (e.g. a buyer's shift away to the substitute) as reaction to e.g. an increase in the price of a good will force its price back to its long-run trend path. Therefore, if a good's price is co-integrated into the long-run development of the

² For a description of the crucial role of steam engines and the mechanisation process in the chocolate producing industry see SCHOLLIERS (1995)

³ One or more time series are called co-integrated if they have the same degree of stationarity, i.e. the mean, variance, and autocovariance (at various lags) are the same at any point of time measured. An integrated time series of order d, I(d) would be if the equation $\Delta Y_t = (Y_t - Y_{t-d}) = u_t$ holds where d denotes the time lag (GUJARATI 1995, p.709-733). For a more detailed discussion see ENGLE & GRANGER (1987) and Section 2.3.2.4.2 plus Appendix I.

prices of one or more similar goods (substitutes), it cannot be considered as a differentiated good. Such a product is perceived by consumers as having distinctive characteristics and thus holds a defined single position in the market. Compared to measuring substitutability by means of demand elasticities, the time series approach has the advantage that it does not necessitate the estimation of an entire demand system which is dependent on the availability of extensive data. Tests for co-integration of price developments need only information on price time series, thus making this method a more parsimonious one.

2.1.2.2 High-value foods (HVF or HVP)

High-value foods are products with considerably higher unit values and much higher income elasticities of demand, such as fresh fruit and vegetables, protein-rich foods such as meats, fish and dairy products, vegetable oils, and prepared 'convenience' foods with high value-added. Compared to representative world prices of traditional staple foods (such as e.g. wheat, maize, sorghum, etc.), ranging from US\$75 to US\$175 per metric ton, these horticultural, livestock, fisheries, oilseed, and prepared foods quote international prices of US\$500 or more per metric ton (JAFFE & GORDON 1993, p.1). Furthermore, in industrialised market economies [developing countries] the estimated income elasticities of demand for cereals, a low-value food, is -0.22 [+0.16], compared with between +0.25 and +0.38 [+0.61 and +1.00] for high-value meat, eggs, and fruit and vegetables (*ibid.*).

2.1.2.3 High value-added foods

High value-added foods (i.e. a product where the difference between the market value and the costs for inputs is comparatively high) are often also highly processed (i.e. a product with a high degree of transformation or preparation), but this does not need to be necessarily the case. For example, (minimally) processed poultry in general has a higher degree of value-added than highly processed oils and fats (BIE 1996, p.251). In fact, adding value can also be achieved by branding and providing appropriate marketing efforts (advertising). For instance, by putting brand stickers on bananas and thus differentiating the fruits from those of the competitors, the bananas' market value can be increased considerably without any processing needing to occur.⁴

Adding value to primary food products is considered to be crucial with respect to the competitiveness of a food producing sector, as value-added is used as a measure for economic performance (Council for Agricultural Science and Technology 1995). Adding value to agricultural raw commodities in terms of processing, packaging, branding, etc. creates national income and wealth. Therefore, most nations are keen on exporting high-value added products, and, on the other hand, tend to restrict the import of them.

⁴ However, advertising itself is not cost-free.

2.1.3 Other classifications

The classifications presented above seem to be reasonable with respect to an exact analysis of what explains competitiveness in international food markets, but they are quite detailed. A simpler classification attempt uses only three categories. Also, it is important to know how international trade statistics categorise food items in their classification systems.

2.1.3.1 A simple three-stage classification

A classification by processing stage divides food into bulk, intermediate and consumer-oriented goods (SCHAFFNER *et al.* 1998, p.232):

Bulk commodities include wheat, rice, feed grains, soybeans, peanuts, cottonseed, flaxseed, safflowerseed, other bulk oilseeds, pulses, and raw sugar. Tropical products, such as green coffee, cocoa, and live animals, are also included in this category.

Intermediate products are principally semi-processed products in the intermediate stage of the food system, such as wheat flour, feeds and fodders, hops, oilseed meals, vegetable oils, and refined sugar.

Consumer-oriented or consumer-ready products are fundamentally end-use products that require little or no additional processing for consumption. Included in this group are such items as fresh and processed horticultural products, fresh and processed meats, snack foods, beer and wine, and other processed food products.

This classification, however, is less exact than the technological one given above and makes analysis of trade determining factors more difficult. In particular, the inclusion of horticultural products and meats into the same group as processed and strongly branded, industrially produced, foods may be problematic, as international competitiveness in these product groups may have different causes.

2.1.3.2 Standard International Trade Classification (SITC) for food items

International trade statistics often use highly aggregated commodity or product classes which makes analysis of trade flows of particular products difficult. Most official international trade statistics is published on the 3-digit level of the Standard International Trade Classification (SITC) which categorises food products as follows (see UNCTAD 1999):

Table 1: 3-Digit Standard International Trade Classification (SITC), Revision 2 for foods

<i>SITC</i>	<i>Commodity / Product</i>	<i>SITC</i>	<i>Commodity / Product</i>
0	Food and live animals	057	Fruit and nuts (not included oil nuts), fresh or dried
001	Live animals chiefly for food	058	Fruit, preserved and fruit preparations
011	Meat and edible meat offals, fresh, chilled or frozen	061	Sugar and honey
012	Meat and edible meat offals (except poultry liver), salted, in brine, dried or smoked	062	Sugar confectionery and other sugar preparations
014	Meat and edible meat offals, prepared or preserved, nes; fish extracts	071	Coffee and coffee substitutes
022	Milk and cream	072	Cocoa
023	Butter	073	Chocolate and other food preparations containing cocoa
024	Cheese and curd	074	Tea and maté
025	Egg and yolks, fresh, dried or otherwise preserved, sweetened or not	075	Spices
034	Fish, fresh (live or dead), chilled or frozen	081	Feeding stuffs for animals (not including unmilled cereals)
035	Fish, dried, salted or in brine, smoked fish	091	Margarine and shortening
036	Crustaceans and molluscs, fresh, chilled, frozen, salted, in brine or dried	098	Edible products and preparations, nes
037	Fish, crustaceans and molluscs, prepared or preserved, nes	1	Beverages
041	Wheat (including spelt) and meslin, unmilled	111	Non-alcoholic beverages, nes
042	Rice	112	Alcoholic beverages
043	Barley	2	Crude materials
044	Maize (corn), unmilled	222	Oil seeds and oleaginous fruit, whole or broken (excluding flours and meals)
045	Cereals, unmilled (other than wheat, rice, barley and maize)	223	Oil seeds and oleaginous fruit, whole or broken (non-defatted flours and meals)
046	Meal and flour of wheat and flour of meslin	4	Animal and vegetable oils and fats
047	Other cereal meals and flours	411	Animal oils and fats
048	Cereal preparations and preparations of flour or starch of fruits or vegetables	423	Fixed vegetable oils, fluid or solid, crude, refined or purified
054	Vegetables, fresh, chilled, frozen or simply preserved, roots, tubers	424	Other fixed vegetable oils, fluid or solid, crude, refined or purified
056	Vegetables, roots and tubers prepared or preserved, nes	431	Animal and vegetable oils and fats, processed and waxes

Note: nes = not elsewhere specified

Source: UNCTAD (1999), *Handbook of International Trade and Development Statistics 1996/1997*, pp.203-209.

Country-specific trade classification systems exist in addition to the SITC which often provide more detailed information on trade of individual products. For example, the *USA* publish Standard Industrial Classification (SIC) codes on a 4-digit level with 49 subgroups including categories such as sauces and salad dressings, breakfast cereals or chewing gum (HENDERSON *et al.* 1996, pp.2-4). The *Australian* ANZSIC (former ASIC) uses only 27 subgroups on the 4-digit level (BIE 1996, pp.252-254). The *European Union* uses apart from the Standard Classification System a further denomination system for products that originally were not included into the Annex II of the European Economic Union Treaty of 1966. These items are called Not-Annex-II Products and include highly processed foods and chemical-technological products which originate from agricultural raw materials (AID 1997, pp.229-234). Not-Annex-II products include products such as yoghurt, ice-cream, yeast, citron acid, fructose, etc. (*ibid.*).

2.1.4 Summary

The non-homogenous good food can be categorised into seven subgroups, which may be quite different with regard to the nature of the international trade and investment patterns that occur in these product groups: (i) *undifferentiated agricultural commodities* which are generally price sensitive and bulky; (ii) *fresh perishable foods* which are difficult to transport but thanks to improved logistics, international trade in these products has been growing rapidly, (iii) *processed foods* which through technological manipulation are products either made edible through the separation of edible and non-edible parts, or which are altered in texture, taste, shelf-life, etc., and where international trade of these products has often only been made possible through a prolonged product life as a result of processing; (iv) *manufactured foods*, as a preparation or mix of different ingredients, and where the way these foods are prepared or the particular combination of ingredients may in many cases be "culturally-bound", thus putting potential restrictions on the international marketability of these foods; (v) *industrially produced food products* (or consumer-packaged foods) which in general cannot be produced in household kitchens, for which branding is very important, and which very often may be designed by large international food and drink corporations from the very start to be sold globally. Furthermore, there are also the concepts of (vi) *high-value foods*, which are characterised by higher selling price levels and higher income elasticities of demand than the average basic foods, and (vii) *high value-added foods*, where value-adding very often may go hand in hand with higher degrees of processing, but sometimes branding alone can already increase the market value of a food product considerably. Finally, the aggregation of similar foods into categories for trade-statistical reasons is regulated in the Standard International Trade Classification (SITC) for food items of the United Nations, but most countries have developed their own, nationally unique, classification systems. These aggregation rules need to be understood, when analysing international trade in aggregate food categories.

2.2 The significance of international trade in food products and foreign direct investments in the food industries

Systematic data collection and research on trade in consumer-oriented food products and on other international activities of food industries, such as foreign direct investments (FDI), has only recently started. One of the pioneering works was conducted by DAYTON & HENDERSON (1992) who used United Nations trade data for a 25-year period to compile detailed trends in international processed food trade. Also, hardly any official statistics until now have provided systematic aggregate figures on trade in consumer-oriented food products. Thus, most of the published information on trade in these products is based on some categorisation and aggregation introduced by individual authors which makes comparison of the different figures sometimes difficult.

The following section reviews existing information on trade in food products and complements it by providing new tables which summarise recently published trade data. In addition, although exact quantitative information on foreign direct investments in the food industries is even more scarce, some insights into the extent of these activities will be presented as well.

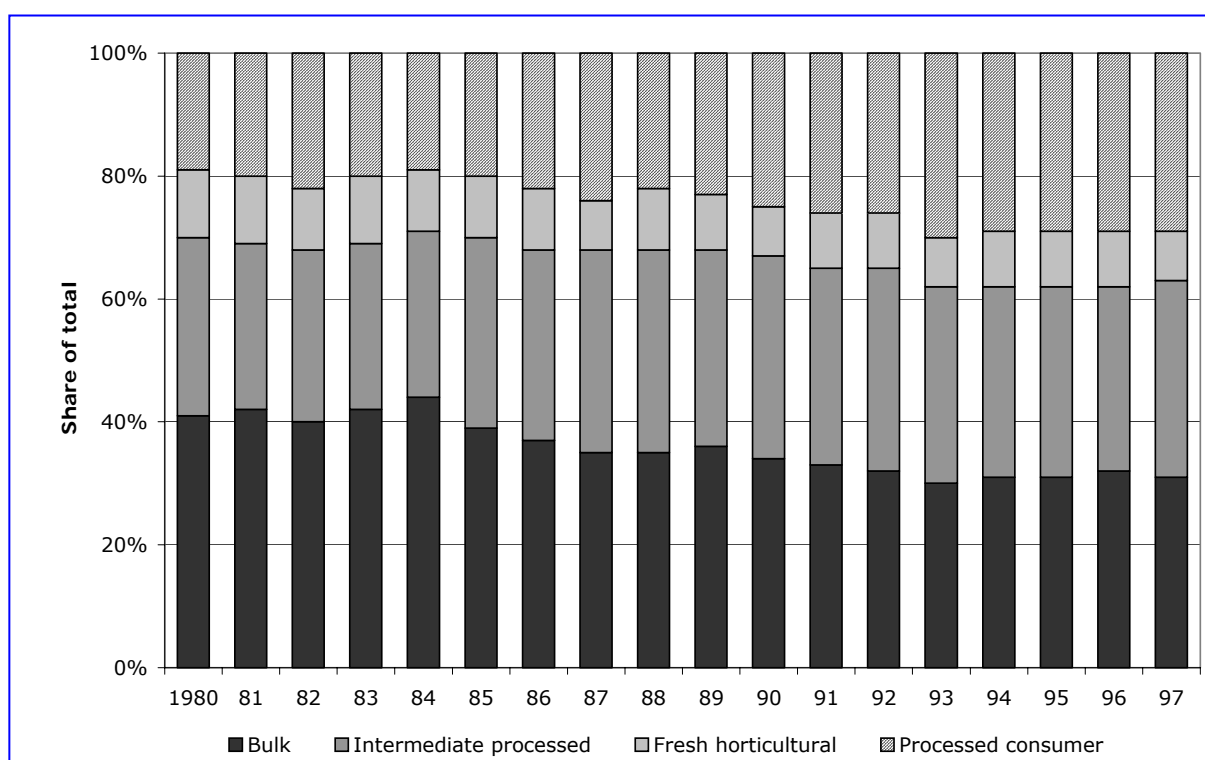
2.2.1 International trade in food products

Describing the structure of trade is a multidimensional task, as trade occurs between different countries in different products and changes over time. Moreover, any presented picture of trade pattern may depend crucially on the underlying aggregation of countries or products.

2.2.1.1 Worldwide overview and the most important countries

According to UN data, in 1990 64% of world food trade consisted of processed food (SHELDON & ABBOTT 1996, p.1). Trade growth in these products during the 1970s and 80s was about 1.3 times the level of bulk commodity trade (442% versus 337%) (*ibid.*). High-value food exports in 1990 reached approximately US\$144bn, which was equal to crude petroleum exports and represented 5% of world commodity trade (CARTER 1997). At this time, world trade in edible horticultural products alone (US\$40.3bn) exceeded that for cereals (US\$38.4bn) (JAFPE & GORDON 1993).

The development of world agricultural trade during 1980 to 1997 is presented in Figure 1. It shows the composition of world agricultural trade broken down into the four categories: (i) *bulk commodities*, (ii) *processed intermediate products*, (iii) *fresh horticultural goods*, and (iv) *processed consumer products*. As it becomes clear, the significance of bulk agricultural commodities in total trade value has decreased strongly, representing about 30% of world agricultural trade in 1997, down from just over 40% in 1980. At the same time, the share of consumer-processed products has risen: from about 20% in 1980 to over 30% in 1997. The shares of the other two product groups, fresh horticultural goods and intermediate processed products, have stayed fairly constant, at about 30% and 10% respectively. All this shows that the real growth in world agricultural trade is within consumer-processed products, and that "bulk commodities are no longer a valid indicator for measuring world agricultural trade growth" (GELHAR & COYLE 2001, p.5).

Figure 1: Composition of world agricultural trade (value), 1980-97

Notes: *Bulk commodities* consist of raw grains, oilseeds, tobacco, and cotton. *Intermediate processed products* consist of semi-processed goods such as flours, meals, and oils. *Fresh horticultural goods* consist of unprocessed fruits and vegetables such as bananas or tomatoes, and nursery products including cut flowers. *Consumer-processed products* include processed products at or near where a substantial degree of processing has taken place. Items in this category include beverages, bakery products, ready to eat cereals and snack food, fresh and frozen meat, and preserved fruit and vegetables.

Source: UN COMTRADE; Economic Research Service, US Department of Agriculture. Reproduced in GEHLHAR M. & COYLE W. (2001), 'Global Food Consumption and Impact on Trade Patterns', in REGMI A. (ed.), *Changing Structure of Global Food Consumption and Trade*, Economic Research Service (ERS), US Department of Agriculture, p.5.

World export shares of several countries and for different food categories are given in Table 2. For the total food category, the share of US food exports in world exports in 1990-92 was slightly less than 20 years ago (19% versus 20%). By contrast, the European Union was able to raise its export share from 11% to 18% over the same time period. With regard to consumer-oriented foods, the EU was the most important exporter in 1990-92 with 27% export share of these products. The US followed with 14% export share of consumer-oriented foods, 6% more as compared to 1970-74. For bulk products, the US is by far the most important exporter, holding about 30% of world exports in 1970-74 as in 1990-92. In intermediate products, finally, in 1990-92 the US lost its leading role which it had in 1970-74 (19% export share) to the EU (18% versus 17% for the US). To sum up, it becomes clear that the world's largest exporters of food products are the US and the EU, with the importance of the latter growing and of the former declining. In consumer-oriented food products the EU is the world leading exporter, whereas the US holds this position for bulk commodities. In intermediate products both countries are about equally important.

Table 2: Major food suppliers by processing stage (% share of exports)

	Average 1970-74	Average 1980-84	Average 1990-92
Total			
United States	20%	23%	19%
European Union	11	14	18
Australia	6	4	5
Canada	4	4	4
China	2	3	4
Bulk*			
United States	28	32	30
Canada	6	7	7
European Union	2	4	6
Australia	3	4	5
Brazil	7	5	5
Intermediate†			
European Union	11	19	18
United States	19	18	17
Australia	11	7	8
Malaysia	2	5	6
Argentina	3	4	5
Consumer-oriented‡			
European Union	19	25	27
United States	8	10	14
Australia	6	4	4
Thailand	2	3	4
New Zealand	5	4	4

Notes: **Bulk* commodities include wheat, rice, feed grains, soybeans, peanuts, cottonseed, flaxseed, safflowerseed, other bulk oilseeds, pulses, and raw sugar. Tropical products, such as green coffee, cocoa, and live animals, are also included in this category.

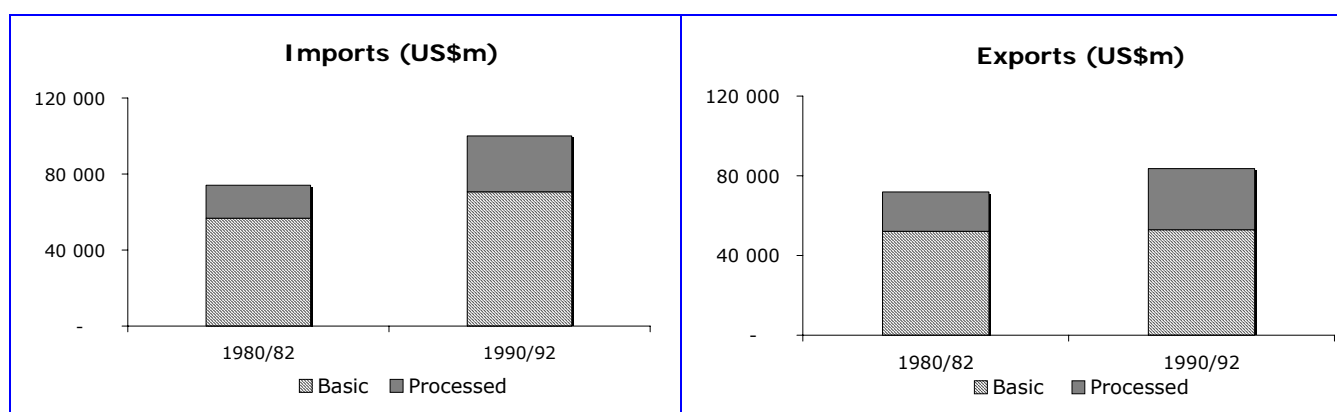
†*Intermediate* products are principally semiprocessed products in the intermediate stage of the food system, such as wheat flour, feeds and fodders, hops, oilseed meals, vegetable oils, and refined sugar.

‡*Consumer-oriented* or consumer-ready products are fundamentally end-use products that require little or no additional processing for consumption. Included in this group are such items as fresh and processed horticultural products, fresh and processed meats, snack foods, beer and wine, and other processed food products.

Source: USDA FAS, *Desk Reference Guide to Agricultural Trade*, Agric. Handbook No. 683, April 1994, p.47. Reproduced in SCHAFFNER D.J., SCHRODER W.R. & EARLE M.D. (1998), *Food Marketing — An International Perspective*, p.232.

In OECD countries⁵ (excluding intra-EU trade, and imports by Turkey, Mexico and Iceland) processed food imports accounted for 29.4% of total food imports in 1990-92 as compared to 23.4% in 1980-82 (OECD 1997, p.15). The annual growth rate within this period was 5.4% for processed food imports and 2.2% for basic products (*ibid.*). The share of processed food exports in total food exports of OECD countries in 1990-92 was 36.7% (29.4% in 1980-82), with annual average growth rates of 0.1% for basic and 4.5% for processed food items (*ibid.*). Figure 2 demonstrates the strong growth in processed food items as compared to basic agricultural commodities in OECD member states. It also shows that these countries were net food importers in both food categories in 1980-82 as well as in 1990-92 (*ibid.*).

⁵ Members of the *Organisation for Economic Co-operation and Development* (OECD) include Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the UK, the USA, Japan, Finland, Australia, New Zealand, Mexico, the Czech Republic, Hungary, Poland, and the Republic of Korea.

Figure 2: Food imports and exports of the OECD countries, US\$ million, 1980-82 and 90-92

Note: Intra-EU trade, and imports and exports by Turkey, Mexico and Iceland are not included.

Source: Author's compilation of data from OECD (1997), *The Uruguay Round Agreement on Agricultural and Processed Agricultural Products*, p.15.

The leading export nations in 1996 are given in Table 3. The US food, beverages and tobacco (excluding agricultural raw materials) exports totalled US\$31.2bn, followed by France (US\$29.6bn), the Netherlands (US\$29.5bn), Germany (US\$22.4bn), the UK (US\$15.2bn), Italy (US\$12.5bn), Australia (US\$8.5bn), and China (US\$8.0bn). At the same time, the US imported foods and beverages worth of US\$37.8bn, followed by France (US\$25.1bn), the Netherlands (US\$20.4bn), Germany (US\$40.1bn), the UK (US\$25.5bn), Italy (US\$20.9bn), Australia (US\$2.8bn), and China (US\$6.2bn). Looking at net export⁶ values, however, results in a different ranking of competitive food export nations. The Netherlands lead the field with US\$9.1bn, followed by Australia (US\$5.7bn), France (US\$4.5bn) and China (US\$1.7bn). Germany was the largest net importer of food products with a US\$17.6bn food trade deficit, followed by the UK (-US\$10.3bn), the US (-US\$6.5bn) and Italy (-US\$8.3bn). However, even these values may not reflect real competitiveness in international food markets, as they are absolute rather than relative figures.

Per capita trade figures⁷ reveal that the Netherlands was the leading food product export nation, in nominal terms (US\$1 906 per capita exports) as on a net export basis (US\$591 per capita net exports). The second largest food product exporter in 1996 was France on the export basis (US\$508 per capita exports) ahead of Australia (US\$470 per capita exports). In per capita net export terms, however, Australia was far ahead of France with US\$312 as compared to US\$77. The leading per capita net food product importer in 1996 was Japan with US\$353 per capita net imports, followed by Germany (-US\$216), the UK (-US\$176), Italy (-US\$145), and the US (-US\$24). These rankings should however be viewed cautiously, since the UN statistics include tobacco in the export values and primary products in the import values. Therefore a closer look at the trade structure of the individual countries seems necessary.

⁶ Net exports = exports - imports.

⁷ In theory it would also be possible to relate trade values to e.g. arable land per country instead of to the population number. However, as food industries today seem more and more able to source their inputs globally, a country's own land resources may not be any longer a limiting determinant for export performance in processed, manufactured or industrially produced food products.

Table 3: World's leading food exporters and food trade balance in some selected countries, 1996

Rank	Country	Food Bev Tob exports in US\$ million	Food Bev Tob export share in total exports (%)	<i>Food Bev imports in US\$ million</i>	Food Bev import share (%)	Proc. Food Bev import share (% total)	Proc. Food Bev import share (% household use)	<i>Net exports in US\$ million</i>	Population in million	<i>Per capita exports in US\$</i>	<i>Per capita imports in US\$</i>	<i>Per capita net exports in US\$</i>
		(1)		(2)		(3)	(4)	(5)		(6)	(7)	(8)
1	USA	31 253.65	5.0	<i>37 813.15</i>	4.6	2.2	1.8	<i>-6 559.50</i>	266.6	<i>117.2</i>	<i>141.9</i>	<i>-24.6</i>
2	France	29 668.93	10.3	<i>25 144.37</i>	9.0	4.6	4.0	<i>4 524.55</i>	58.4	<i>508.2</i>	<i>430.7</i>	<i>77.5</i>
3	Netherlands	29 586.80	15.0	<i>20 412.56</i>	11.3	5.1	4.1	<i>9 174.23</i>	15.5	<i>1 906.7</i>	<i>1 315.5</i>	<i>591.2</i>
4	Germany	22 408.89	4.3	<i>40 102.11</i>	8.8	4.0	3.5	<i>-17 693.22</i>	81.9	<i>273.6</i>	<i>489.6</i>	<i>-216.0</i>
5	UK	15 201.72	5.8	<i>25 587.76</i>	8.9	5.5	4.6	<i>-10 386.04</i>	58.8	<i>258.6</i>	<i>435.3</i>	<i>-176.7</i>
6	Italy	12 545.21	5.0	<i>20 903.89</i>	10.1	3.8	3.4	<i>-8 358.68</i>	57.4	<i>218.6</i>	<i>364.2</i>	<i>-145.6</i>
7	Australia	8 595.89	14.2	<i>2 878.83</i>	4.4	3.2	2.7	<i>5 717.06</i>	18.3	<i>470.0</i>	<i>157.4</i>	<i>312.6</i>
8	China	8 013.44	5.3	<i>6 252.48</i>	4.5	1.8	0.4	<i>1 760.97</i>	1 232.1	<i>6.5</i>	<i>5.1</i>	<i>1.4</i>
9	Spain	7 955.97	7.8	<i>13 031.53</i>	10.7	4.1	3.8	<i>-5 075.56</i>	39.3	<i>202.6</i>	<i>331.8</i>	<i>-129.2</i>
10	Thailand*	7 107.42	12.8	<i>2 011.58</i>	2.8	1.2	1.0	<i>5 095.84</i>	60.0	<i>118.5</i>	<i>33.5</i>	<i>84.9</i>
11	India*	3 173.48	9.6	<i>1 495.09</i>	4.0	2.5	0.6	<i>1 678.38</i>	936.0	<i>3.4</i>	<i>1.6</i>	<i>1.8</i>
12	Turkey	2 239.05	9.7	<i>2 038.32</i>	4.8	2.1	1.4	<i>200.73</i>	62.7	<i>35.7</i>	<i>32.5</i>	<i>3.2</i>
13	Greece*	1 993.77	18.2	<i>3 603.83</i>	13.9	6.9	6.5	<i>-1 610.06</i>	10.5	<i>190.3</i>	<i>344.0</i>	<i>-153.7</i>
14	Hungary	1 934.93	15.3	<i>539.04</i>	3.4	1.8	1.4	<i>1 395.89</i>	10.2	<i>189.8</i>	<i>52.9</i>	<i>136.9</i>
15	Japan	1 643.70	0.4	<i>46 092.35</i>	13.2	3.6	3.1	<i>-44 448.65</i>	125.8	<i>13.1</i>	<i>366.5</i>	<i>-353.4</i>
16	Finland	922.62	2.4	<i>1 756.25</i>	6.0	3.2	2.7	<i>-833.63</i>	5.1	<i>180.0</i>	<i>342.7</i>	<i>-162.7</i>

Notes: *Data for 1995

(1) Food, beverages and tobacco exports (excluding agricultural products) as given by the statistics

(2) Food and beverages (including primary products) import value calculated by multiplying given share with value of total imports

(3) Share of processed food and beverages imports in total imports

(4) Share of processed food and beverages imports for household use in total imports

(5) Net exports calculated by subtracting (2) from (1) although both aggregates are not completely identical

(6) Per capita food, beverages and tobacco exports calculated by dividing (1) through population

(7) Per capita processed food and beverages imports calculated by dividing (2) through population

(8) Per capita net processed food exports calculated by subtracting (7) from (6).

Source: United Nations (1997), *1996 International Trade Statistics Yearbook — Volume I: Trade by Country*; United Nations (1998), *Demographic Yearbook 1996*;
 Author's calculations (in *italics*).

Table 4 and Table 5 present a more accurate aggregation, since the figures given in Table 3 also contain products that cannot be considered as processed, manufactured, industrially produced food products or high-value food items. The aggregation in Table 4 and Table 5 includes the food categories meat and preparations (SITC 01), dairy products (SITC 02), fish and preparations (SITC 03), prepared cereals (SITC 048), vegetable and fruit (SITC 05), refined sugar and preparations (SITC 0612), coffee, tea, cocoa, spices (SITC 07), miscellaneous edible products (SITC 09), beverages (SITC 11) and oils and fats (SITC 4). Not included are live animals for food (SITC 001), grains and unmilled cereals (SITC 041-047), raw sugar (SITC 06), feeding stuffs for animals (SITC 081), and tobacco (SITC 12). The tables give insights into the trade structure of the world leading food trade nations and they also provide the share of individual food categories in the total processed food, beverages and fats trade.

The United States was a main producer of grains and unmilled cereals, of animal feed and of tobacco in 1996. This explains why the export value for aggregated processed food, beverages and fats is only half of that for total food and live animals (SITC 0). Within the processed and high-value food category, fruit and vegetables (33.2% share in total processed food, beverages and fats exports), meat and preparations (29.9%), and fish and preparations (13.0%) are the largest groups. The US was also a main exporter of miscellaneous edible products (10.7%). With regard to imports, it is striking that the US was also a main importer of fruit and vegetables (30.0% share in total processed food, beverages and fats imports), and of fish and preparations (24.5%). This can already be seen as a hint for the significance of intra-industry trade in the processed and high-value food trade. Finally, alcoholic beverages accounted for 18.0% of US imports.

France exported mainly alcoholic beverages (25.7%), dairy products (15.2% with cheese and curd accounting for 7.8% share of total processed food, beverages and fats exports) and meat and preparations (15.1%). Miscellaneous edible products accounted for 7.5% of total processed and high-value food exports. The main imports in 1996 were fruit and vegetables (26.5%), meat and preparations (15.9%), and fish and preparations (14.0%). In general, the trade structure seems to be more divers than the US one.

The Netherlands' processed and high-value food exports in 1996 included as main groups horticultural products (26.0% share, with 14.8% for fresh or simply preserved vegetables), meat and preparations (20.3% for the total group and 6.8% for pig meat fresh, chilled or frozen), and dairy products (18.5%). Cheese and curd exports accounted for 8.7% of total exports and at US\$2.28bn exceeded even those of France (US\$2.23bn). The main imports in 1996 were: fruit and vegetables (30.9% with fruit, nuts fresh, dried accounting for 11.3%), dairy products (15.7% with milk and cream accounting for 11.1%), and coffee, tea, cocoa, spices (14.1% with cocoa alone 7.0%).

Germany exported as main food items in 1996 dairy products (32.1%, with milk and cream accounting for 19.0%), coffee, tea, cocoa, spices (16.8%), and fruit and vegetables (14.0%). Alcoholic beverages exports contributed 10.6% to total processed and high-value food exports. 34.9% of the imports of these products were in fruit and vegetables (15.1% fruit, nuts fresh, dried), 15.3% in meat and preparations (5.9% pig meat fresh, chilled, frozen), and 10.6% in dairy products (6.5% for cheese and curd).

Table 4: Food trade structure of selected countries in 1996

SITC	Product	Trade values in US\$ million															
		United States				France				Netherlands				Germany			
		Exports	%	Imports	%	Exports	%	Imports	%	Exports	%	Imports	%	Exports	%	Imports	%
	<i>Proc food, bev and fats*</i>	23 464.0	100.0	28 642.4	100.0	28 537.8	100.0	22 920.0	100.0	26 163.3	100.0	14 539.4	100.0	15 425.8	100.0	35 562.8	100.0
0	Food and live animals	45 773.7		31 114.0		29 974.7		23 611.1		27 057.6		16 618.9		20 907.7		35 801.1	
001	Live animals for food					1 706.7				1 039.5		450.2					
01	Meat and preparations	7 007.3	29.9	2 469.0	8.6	4 321.5	15.1	3 652.5	15.9	5 303.5	20.3	1 313.6	9.0	2 010.8	13.0	5 442.6	15.3
011	Meat fresh, chilled, frozen	6 426.6	27.4	1 940.4	6.8	3 664.6	12.8	3 134.0	13.7	4 387.6	16.8	1 002.8	6.9	1 537.1	10.0	4 659.7	13.1
0111	Bovine meat fresh, frozen	2 381.7	10.2	1 230.3	4.3	1 117.0	3.9	982.3	4.3	1 324.9	5.1			959.4	6.2	883.7	2.5
0113	Pig meat fresh, chilled, frozen									1 786.7	6.8					2 100.5	5.9
0114	Poultry fresh, chilled, frozen	2 311.2	9.8			1 564.9	5.5			1 042.8	4.0						
014	Meat prepd, prsrd, nes etc									474.0	1.8						
02	Dairy products, birds' eggs					4 345.9	15.2	2 013.1	8.8	4 839.5	18.5	2 283.1	15.7	4 956.8	32.1	3 775.5	10.6
022	Milk and cream					1 726.0	6.0	743.7	3.2	1 460.4	5.6	1 611.0	11.1	2 931.6	19.0		
0224	Milk, cream preserved etc					1 087.2	3.8			1 180.9	4.5	1 203.8	8.3	1 560.9	10.1		
023	Butter									565.5	2.2	228.8	1.6				
024	Cheese and curd					2 238.1	7.8			2 288.4	8.7	360.4	2.5	1 738.8	11.3	2 315.7	6.5
025	Eggs, birds, fresh, prsrd									525.2	2.0						
03	Fish and preparations	3 058.6	13.0	7 026.9	24.5	980.6	3.4	3 206.1	14.0	1 395.8	5.3	943.4	6.5			2 365.8	6.7
034	Fish fresh, chilled, frozen	1 902.4	8.1	2 510.6	8.8			1 415.5	6.2	769.9	2.9	496.9	3.4			1 365.5	3.8
036	Shell fish fresh, frozen			3 309.4	11.6			890.7	3.9								
04	Cereals and preparations	18 437.3				7 600.2		2 196.1		1 670.2		2 135.8		3 828.7		2 623.9	7.4
048	Cereals etc preparations					1 733.3	6.1	1 609.5	7.0	1 271.2	4.9	579.6	4.0	1 814.1	11.8	1 557.9	4.4
0484	Bakery products									590.2	2.3						
05	Vegetable and fruit	7 781.7	33.2	8 600.0	30.0	3 701.5	13.0	6 062.9	26.5	6 800.7	26.0	4 494.5	30.9	2 166.7	14.0	12 428.2	34.9
054	Veg etc frsh, simply prsrd	1 941.6	8.3	2 488.0	8.7	1 304.9	4.6	1 849.8	8.1	3 883.3	14.8	1 545.8	10.6			4 065.4	11.4
0544	Tomatoes fresh									833.8	3.2						
057	Fruit, nuts, fresh, dried	4 047.8	17.3	3 570.1	12.5	1 487.0	5.2	2 512.1	11.0	1 275.6	4.9	1 642.7	11.3			5 386.9	15.1
0579	Fruit fresh or dried nes					847.7	3.0					468.2	3.2			1 432.2	4.0
058	Fruit preserved, prepared					1 189.9	4.2			883.2	3.4	1 032.1	7.1			2 035.7	5.7
06	Sugar and preps, honey					2 077.0		691.5		577.6		451.8					
0612	Refined sugar etc.					1 491.7	5.2										
07	Coffee, tea, cocoa, spices			4 899.4	17.1	1 731.7	6.1	2 728.8	11.9	1 909.6	7.3	2 053.7	14.1	2 595.4	16.8	4 018.9	11.3
071	Coffee and substitutes			2 884.0	10.1			1 110.1	4.8			599.4	4.1			2 129.0	6.0
072	Cocoa									985.5	3.8	1 015.7	7.0				
073	Chocolate and products					1 028.1	3.6	961.5	4.2	655.1	2.5						
081	Feeding stuff for animals	4 387.1				1 365.0		1 701.7		2 233.4		1 960.4		1 449.2		1 802.3	
09	Misc edible products	2 512.3	10.7			2 144.6	7.5	918.7	4.0	1 287.9	4.9	532.4	3.7			1 737.0	4.9
098	Edible products, preps nes	2 361.9	10.1			2 092.5	7.3			1 015.8	3.9	461.4	3.2			1 669.6	4.7
09809	Misc food preparations nes	1 830.6	7.8			1 864.8	6.5			554.7	2.1					1 355.5	3.8
1	Beverages and tobacco	8 024.8		7 031.4		8 378.7		3 388.0		4 909.4		2 083.5		3 519.2		4 245.2	
11	Beverages	1 361.1	5.8	5 647.1	19.7	8 086.9	28.3	1 651.5	7.2	1 862.9	7.1	1 111.6	7.6	1 882.0	12.2	2 947.6	8.3
111	Non-alcoholic beverages nes					758.5	2.7										
112	Alcoholic beverages			5 164.7	18.0	7 328.4	25.7	1 372.8	6.0	1 489.1	5.7	850.4	5.8	1 631.6	10.6	2 711.8	7.6
11212	Wine of fresh grapes					4 785.3	16.8					557.4	3.8			1 821.6	5.1
1123	Beer, ale, stout, porter									1 160.9	4.4						
1124	Distilled alcoholic beverages					2 316.6	8.1										
11242	Distilled wine, grape marc					1 829.8	6.4										
12	Tobacco and manufactures	6 663.7						1 736.5		3 046.5		971.9		1 637.3		1 297.6	
4	Animal, vegetable oil, fat	1 743.1	7.4					1 076.7	4.7	1 492.2	5.7	1 227.4	8.4			1 289.2	3.6
42	Fixed vegetable oil, fat									971.6	3.7	822.5	5.7				

Note: *Calculated by adding SITC 01, 02, 03, 048, 05, 0612, 07, 09, 11 and 4.

Source: United Nations (1997), 1996 International Trade Statistics Yearbook — Volume I: Trade by Country; Author's calculations (in italics).

Table 5: Food trade structure of selected countries in 1996

		Trade values in US\$ million															
SITC	Product	United Kingdom				Italy				Australia				China			
		Exports	%	Imports	%	Exports	%	Imports	%	Exports	%	Imports	%	Exports	%	Imports	%
	Proc food, bev and fats*	<i>11 268.0</i>	<i>100.0</i>	<i>22 976.7</i>	<i>100.0</i>	<i>13 762.9</i>	<i>100.0</i>	<i>15 765.3</i>	<i>100.0</i>	<i>6 495.7</i>	<i>100.0</i>	<i>2 191.5</i>	<i>100.0</i>	<i>8 999.7</i>	<i>100.0</i>	<i>2 332.8</i>	<i>100.0</i>
0	Food and live animals	10 652.3		22 321.2		11 995.1		19 571.3		12 365.7		2 276.7		10 206.7		5 648.9	
001	Live animals for food							1 424.7		503.3				462.2			
01	Meat and preparations	1 620.2	<i>14.4</i>	3 939.0	<i>17.1</i>	1 090.3	<i>7.9</i>	3 607.3	<i>22.9</i>	2 264.5	<i>34.9</i>			1 437.8	<i>16.0</i>		
011	Meat fresh, chilled, frozen	1 444.6	<i>12.8</i>	2 110.8	<i>9.2</i>			3 451.8	<i>21.9</i>	2 219.0	<i>34.2</i>			1 083.6	<i>12.0</i>		
0111	Bovine meat fresh, frozen	219.2	<i>1.9</i>					1 340.7	<i>8.5</i>	1 621.1	<i>25.0</i>						
0112	Mutton etc fresh, chilled, frozen									413.1	<i>6.4</i>						
0113	Pig meat fresh, chilled, frozen							1 764.4	<i>11.2</i>								
0114	Poultry fresh, chilled, frozen													690.9	<i>7.7</i>		
0121	Pig meat dried, salted, smoked			1 060.2	<i>4.6</i>												
014	Meat prepd, prsrd, nes etc			766.1	<i>3.3</i>									344.8	<i>3.8</i>		
02	Dairy products, birds' eggs	1 055.4	<i>9.4</i>	1 710.3	<i>7.4</i>	945.4	<i>6.9</i>	2 984.4	<i>18.9</i>	1 344.3	<i>20.7</i>						
022	Milk and cream							1 425.5	<i>9.0</i>	810.1	<i>12.5</i>						
0224	Milk, cream preserved etc									709.2	<i>10.9</i>						
024	Cheese and curd			983.4	<i>4.3</i>	845.6	<i>6.1</i>	1 334.9	<i>8.5</i>	368.3	<i>5.7</i>						
03	Fish and preparations	1 110.8	<i>9.9</i>	1 901.0	<i>8.3</i>			2 515.6	<i>16.0</i>	821.8	<i>12.7</i>	473.6	<i>21.6</i>	2 855.3	<i>31.7</i>	600.4	<i>25.7</i>
034	Fish fresh, chilled, frozen			808.2	<i>3.5</i>			1 024.6	<i>6.5</i>					866.7	<i>9.6</i>	380.8	<i>16.3</i>
036	Shell fish fresh, frozen							801.8	<i>5.1</i>	622.3	<i>9.6</i>			781.8	<i>8.7</i>		
037	Fish etc prepd, prsrd nes			851.2	<i>3.7</i>							174.8	<i>8.0</i>	1 131.2	<i>12.6</i>		
04	Cereals and preparations	2 638.0		2 025.1		2 834.6		2 381.6		4 547.2		165.0		604.3	<i>6.7</i>	2 601.3	
048	Cereals etc preparations	1 515.5	<i>13.4</i>	1 125.4	<i>4.9</i>	1 998.5	<i>14.5</i>			292.3	<i>4.5</i>						
0483	Macaroni, spaghetti etc					1 204.4	<i>8.8</i>										
0484	Bakery products	705.3	<i>6.3</i>			755.0	<i>5.5</i>										
05	Vegetable and fruit			6 489.5	<i>28.2</i>	4 828.2	<i>35.1</i>	2 795.9	<i>17.7</i>	856.2	<i>13.2</i>	459.6	<i>21.0</i>	3 178.6	<i>35.3</i>		
054	Veg etc frsh, simply prsrd			2 218.8	<i>9.7</i>	1 692.8	<i>12.3</i>	901.9	<i>5.7</i>	361.3	<i>5.6</i>			1 357.8	<i>15.1</i>		
0542	Leguminous vegetables dry									181.7	<i>2.8</i>			248.2	<i>2.8</i>		
05461	Vegetables frozen					791.4	<i>5.8</i>										
056	Vegetables etc prsrd, prepd													944.9	<i>10.5</i>		
057	Fruit, nuts, fresh, dried			2 812.6	<i>12.2</i>	2 081.6	<i>15.1</i>	1 265.2	<i>8.0</i>	340.7	<i>5.2</i>			417.6	<i>4.6</i>		
0579	Fruit fresh or dried nes					978.6	<i>7.1</i>										
058	Fruit preserved, prepared			1 017.6	<i>4.4</i>	829.9	<i>6.0</i>							458.4	<i>5.1</i>		
06	Sugar and preps, honey			1 355.0						1 284.4				415.3		427.7	
0612	Refined sugar etc.													238.6	<i>2.7</i>		
07	Coffee, tea, cocoa, spices	1 052.6	<i>9.3</i>	1 976.8	<i>8.6</i>	829.6	<i>6.0</i>	1 319.6	<i>8.4</i>			379.4	<i>17.3</i>	547.3	<i>6.1</i>		
071	Coffee and substitutes							876.7	<i>5.6</i>								
0741	Tea													282.5	<i>3.1</i>		
072	Cocoa																
081	Feeding stuff for animals			1 335.1	<i>5.8</i>			1 403.3		390.5				365.5		1 299.5	
09	Misc edible products			1 280.2	<i>5.6</i>					202.1	<i>3.1</i>	398.5	<i>18.2</i>				
098	Edible products, preps nes			1 179.1	<i>5.1</i>							394.2	<i>18.0</i>				
09809	Misc food preparations nes			927.2	<i>4.0</i>							295.9	<i>13.5</i>				
1	Beverages and tobacco	6 810.6		4 455.2		3 135.0		2 117.7		577.4		399.8		1 341.9		497.3	
11	Beverages	4 913.5	<i>43.6</i>	3 482.4	<i>15.2</i>	2 875.1	<i>20.9</i>	792.5	<i>5.0</i>	528.1	<i>8.1</i>	266.9	<i>12.2</i>	366.2	<i>4.1</i>	40.4	<i>1.7</i>
112	Alcoholic beverages	4 652.1	<i>41.3</i>	3 264.2	<i>14.2</i>	2 733.9	<i>19.9</i>	734.9	<i>4.7</i>	496.5	<i>7.6</i>	258.4	<i>11.8</i>				
11212	Wine of fresh grapes			2 201.3	<i>9.6</i>	2 128.7	<i>15.5</i>			430.5	<i>6.6</i>						
1124	Distilled alcoholic beverages	4 083.9	<i>36.2</i>									188.6	<i>8.6</i>				
11241	Whisky	3 609.1	<i>32.0</i>														
12	Tobacco and manufactures	1 897.1		972.7				1 325.2						975.7		457.0	
4	Animal, vegetable oil, fat			1 072.1	<i>4.7</i>	1 195.8	<i>8.7</i>	1 750.1	<i>11.1</i>	186.4	<i>2.9</i>	213.5	<i>9.7</i>	375.9	<i>4.2</i>	1 692.0	<i>72.5</i>
411	Animal oils and fat									151.3	<i>2.3</i>						
42	Fixed vegetable oil, fat							1 603.0	<i>10.2</i>			185.5	<i>8.5</i>	351.1	<i>3.9</i>	1 571.2	<i>67.4</i>
4235	Olive oil					921.0	<i>6.7</i>	1 176.7	<i>7.5</i>								

Note: *Calculated by adding SITC 01, 02, 03, 048, 05, 0612, 07, 09, 11 and 4.

Source: United Nations (1997), 1996 International Trade Statistics Yearbook — Volume I: Trade by Country; Author's calculations (in *italics*).

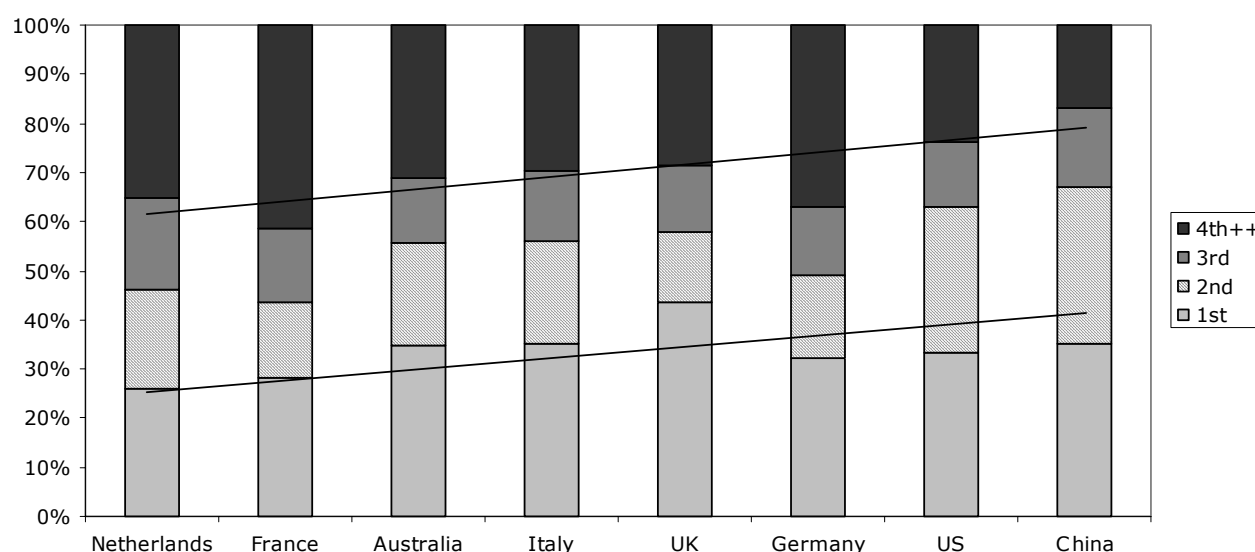
The United Kingdom's processed food, beverages and fats exports were dominated by beverages which accounted for 43.6% (32.0% for whiskey alone) in 1996. Other important export food categories were meat and preparations (14.4%), and cereal preparations (13.4%). Main imports were fruit and vegetables (28.2%, with fruit, nuts fresh, dried accounting for 12.2%), meat and preparations (17.1%), and beverages (15.2%, with wine of fresh grapes alone 9.6%). 5.6% of the food imports were miscellaneous edible products.

Italy was a main exporter of wine of fresh grapes (15.5%), of fruits (15.1%), vegetables (12.3%), macaroni, spaghetti etc. (8.8%), olive oil (6.7%), and cheese and curd (6.1%) in 1996. In more aggregated terms, fruit and vegetables accounted for 35.1%, beverages for 20.9%, oils and fats for 8.7%, and meat and preparations for 7.9% of total processed and high-value food exports. Main imports were meat and preparations (22.9%), dairy products (18.9%, with 9.0% accounting for milk and cream alone), fruit and vegetables (17.7%), fish and preparations (16.0%), and oils and fats (11.1%, with olive oil accounting for 7.5%).

Australia as a large agricultural producer had processed food, beverages and fats exports contributing to about half the value of food and live animals shipments in 1996. Within this group exports of meat and preparations totalled 34.9% (34.2% for meat fresh, chilled, frozen alone), of dairy products 20.7% (12.5% for milk and cream), fruit and vegetables 13.2%, and beverages 8.1% (with wine of fresh grapes accounting for 6.6%). Main imports were fish and preparations (21.6%), fruit and vegetables (21.0%), miscellaneous edible products (18.2%), and coffee, tea, cocoa, spices (17.3%).

China exported mainly fruit and vegetables (35.3%, with 10.5% for vegetables etc. preserved, prepared), fish and preparations (31.7%, fish etc prepared, preserved nes accounting for 12.6%), and meat and preparations (16.0%). 83.7% of China's food imports in 1996 were made up of only two categories: fixed vegetable oil, fat (67.4%) and fish fresh, chilled frozen (16.3%).

The general picture arising from the data provided in Table 4 and Table 5 is that in all of the leading food exporting nations the food export scheme is quite diverse. With the exception of the UK where beverages accounted for 43.6% of total food, beverages and fats exports in 1996, in all other countries the most significant export food category never exceeded 36%. In fact, the two leading food, beverages and fats export nations (France with US\$28.5bn and the Netherlands with US\$26.1bn worth of exports) had the most diversified export pattern, with none of the individual food categories exceeding 29% (France) and 26% (Netherlands). Figure 3 illustrates this conclusion in a more systematic way by displaying a possible connection between per capita exports of a country and the diversity of its export structure.

Figure 3: Export diversity structure of world leading exporters of food products, 1996

Notes: Figure shows the shares of the most important export product categories in total processed food, beverages and fats export of individual countries.

1st = food category with highest share in total exports, 2nd = food category with the second highest share in total exports, ..., 4th++ share of the sum of all remaining food categories .

Countries are ranked in an ascending order according to per capita exports as calculated by total processed food, beverages and fats exports (as given in Tables 4 and 5) divided by countries' population (as provided in Table 3). The Netherlands have the highest per capita exports, China the lowest.

Trend lines are manually fitted.

Source: Author's compilation based on data given in Tables 4 and 5.

Figure 3 suggests a possible relationship between a country's per capita consumer-oriented food exports and the diversity of its export structure, as measured by the share of the most important food categories in its total processed food, beverages and fats exports. It seems that the higher per capita exports are, the lower the share of the most important food category and the larger the combined share of the fourth and higher categories. This means that a successful food product exporting nation is one that is not specialised in only one or two food categories, but exports a whole variety of different food items, each of them with considerable share in total exports.

Developing countries' share in worldwide exports of processed and high-value food products for the period between 1980-81 and 1994-95 is provided in Table 7. As it becomes clear, this share has evolved for individual food categories differently, but it has increased in more food product groups than in those where it has decreased. With respect to the EU market, MATTHEWS (1994) showed that the share of *primary processed foods* and of *manufactured food products* imported from developing countries increased slightly between 1984-86 and 1990 (from 35.3% to 36.0% for the former and from 4.1% to 4.6% for the later category respectively). However, as Table 7 shows, the share of the least developed countries in the worldwide exports of food products has slightly declined in 1994-95 as compared to 1980-81 (from 31.3% to 31.0%), thus emphasising the weak standing of these countries in the global exports of food products.

2.2.1.2 The main products

The largest product category which accounted for 30% of the global export value in 1987 was miscellaneous food and kindred products with US\$23.3bn (HENDERSON *et al.* 1996a, p.26). This category includes fish and seafoods fresh, canned or frozen, coffee and other food preparations nes. The second most important category was meat products (18%), followed by sugar and confectionery products (11%), and the smallest categories were bakery products and grain mill products (6.7% altogether) (*ibid.*).

In 1995, total world food exports accounted for US\$427bn which was 9.5% of total world commodity exports (UNCTAD 1999, see also Table 7). The most important processed or high-value food products were meat fresh, chilled, frozen (with 8.7% share in world food exports), alcoholic beverages (6.0%), fruit, nuts fresh, dried (5.8%), vegetables etc. fresh, simply preserved (5.2%), and fish fresh, chilled, frozen (4.5%).

Fresh fish (including shell fish) and fish preparations were the most important high-value and processed food items for developing countries' exports in 1994-95 (Table 7). For example, 66.9% of shell fish fresh, frozen and 55.4% of fish etc. prepared, preserved nes world exports came from least developed countries in 1994-95. In 1997, global fishery exports were worth some US\$51bn which represented 10% of the value of global agricultural exports and about 1% of total merchandise trade (FAO 1999). Despite the fact that most seafood exports occur in some kind of processed form because fish is highly perishable (*ibid.*), there was an increase by a factor of 11 between 1976 and 1996 in the (nominal) value of world wide fresh fish exports, according to the FAO Fishery Database. Table 6 illustrates the high growth rate in international fresh seafood trade.

Table 6: World fresh fish exports 1976 and 1996, in US\$ million

	1976	1996	<i>Increase factor</i>
Cephalopods	7.1	292.7	<i>41.0</i>
Crustaceans	139.9	1 376.8	<i>9.8</i>
Demersl marine fish	226.4	1 827.9	<i>8.1</i>
Freshwater diadrom	172.3	2 940.7	<i>17.1</i>
Marine fish nes	52.6	684.8	<i>13.0</i>
Molluscs excl cephalopods	82.5	791.8	<i>9.6</i>
Pelagic marine fish	144.6	1 076.1	<i>7.4</i>
Total	825.4	8 990.8	<i>10.9</i>

Note: nes = not elsewhere specified

Source: FAO, *Fishery Online-Database*: www.fao.org/databases/fisheries, Oct. 1999; Author's calculations (in *italics*).

The product categories with the highest growth rates (Table 7) between 1980 and 1995 were all highly processed items such as food preparations nes (11.6%), cereal preparations (11.2%), non-alcoholic beverages (11.4%), and sugar preparations non-chocolate (10.3%).

Table 7: Value of world trade in food products, 1980-95

SITC	Product category	World exports 1994-95 US\$ million	Share (%) in world food exports	Share (%) in total world exports	Growth rate (%) 1980-95	LDC* share of world exports		
						1980-81	1994-95	Change
011	Meat fresh, chilled, frozen	37 067.2	8.67	0.83	6.2	12.7	14.9	2.2
112	Alcoholic beverages	25 592.2	5.99	0.57	7.4	6.3	8.9	2.6
057	Fruit, nuts fresh, dried	24 935.1	5.84	0.55	6.0	43.6	40.2	-3.4
054	Veg etc fresh, simply prsvd	22 298.5	5.22	0.50	8.0	33.5	29.2	-4.3
034	Fish fresh, chilled, frozen	19 405.2	4.54	0.43	9.6	34.0	33.5	-0.5
036	Shell fish fresh, frozen	16 958.6	3.97	0.38	10.7	60.7	66.9	6.2
048	Cereal etc preparations	14 788.3	3.46	0.33	11.2	9.2	13.2	4.0
098	Edible products, preps nes	14 147.1	3.31	0.32	11.6	10.2	13.2	3.0
022	Milk and cream	12 395.2	2.90	0.28	7.2	2.1	5.0	2.9
058	Fruit preserved, prepared	11 372.4	2.66	0.25	7.9	37.0	36.0	-1.0
024	Cheese and curd	10 384.1	2.43	0.23	6.9	-	-	-
423	Fixed veg oils, soft	10 127.9	2.37	0.23	6.9	27.9	38.2	10.3
037	Fish etc prepd, prsvd nes	8 355.3	1.96	0.19	8.2	33.9	55.4	21.5
424	Fixed veg oil nonsoft	7 298.6	1.71	0.16	5.2	84.4	85.7	1.3
073	Chocolate and products	7 221.0	1.69	0.16	10.5	-	-	-
014	Meat prepd, prsvd, nes etc	5 486.8	1.28	0.12	6.3	30.4	23.6	-6.8
111	Non-alcohol beverages nes	4 185.0	0.98	0.09	11.4	19	20.6	1.6
062	Sugar preps non-chocolate	3 668.5	0.86	0.08	10.3	15.5	23.6	8.1
<i>Total food</i>		427 336.3	59.83 [†]	9.53	8.4 [‡]	31.3	31.0	-0.3

Notes: *LDC = Least developed countries. [†] sum of column. [‡] mean of column. nes = not elsewhere specified.

Source: UNCTAD (1999), *Handbook of International Trade and Development Statistics 1996/1997*; Author's calculations (in *italics*).

OECD countries (excluding intra-EU trade) in the early 1990s imported as main processed food items fruit and vegetable products (35.9% share in total processed food imports), followed by oils and fats (13.0%) (OECD 1997, p.15). The main processed export goods were dairy products (24.4% share in total processed food exports) and prepared cereal products (14.4%) (*ibid.*, p.16). The highest annual growth rates in processed food imports in the period from 1980-82 to 1990-92 were achieved by edible products and preparations nes (12.4% average annual growth rate) and prepared cereal products (11.8%). With regard to exports, prepared cereal products achieved 10.7% and coffee, cocoa and chocolate products (not displayed in the charts) 8.5% annual growth (*ibid.*). Figure 4 and Figure 5 show the situation.

Figure 4: Imports of foods (basic and processed) of OECD countries, 1980-82 and 1990-92

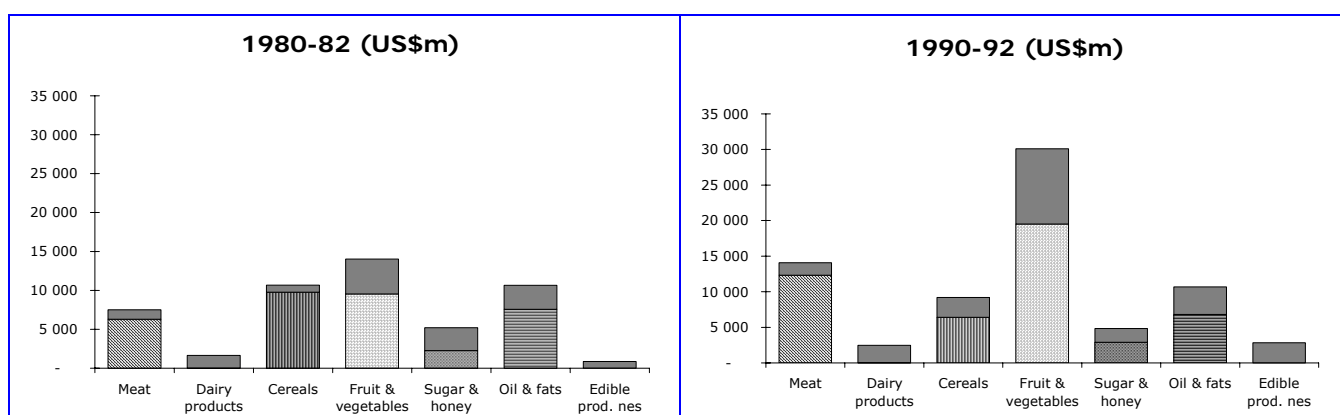
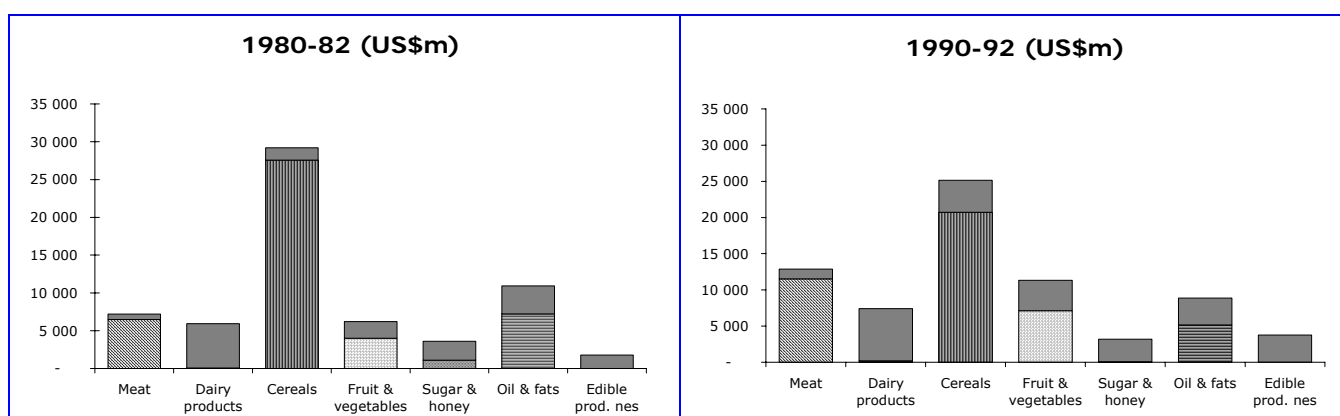


Figure 5: Exports of foods (basic and processed) of OECD countries, 1980-82 and 1990-92



Notes: ■ processed. nes = not elsewhere specified.

Intra-EU trade, and imports and exports by Turkey, Mexico and Iceland are not included.

Edible products and preparations nes include food items such as soups, sauces and seasonings, ice-cream, yeast, sweet corn and vinegar.

Source: Author's compilation of data from OECD (1997), *The Uruguay Round Agreement on Agricultural and Processed Agricultural Products*, pp.15-16.

2.2.1.3 Intra-industry trade

The simultaneous exchange of similar goods is called intra-industry trade. The finding that countries export and import the same types of processed and high-value foods at the same time resulted already from the figures of Table 4 and Table 5. The extent of intra-industry trade can be measured by the *Grubel-Lloyd Index*⁸.

Within the European Union in 1992 almost half of the trade in food and beverages was of the intra-industry kind, as Table 8 shows. Belgium lead the field with 62% of its food and beverages trade being intra-industry, followed by Germany (58%), the Netherlands (56%), France (54%), and the UK (49%) (TRAILL 1997, p.396). In Greece, Portugal, Italy and Denmark intra-industry trade was less than EU average.

Table 8: EU intra-industry trade in food and beverages, 1980/92 (Grubel-Lloyd Index)

Country	1980	1992
Belgium	.57	.62
Germany	.53	.58
Netherlands	.54	.56
France	.49	.54
United Kingdom	.45	.49
Spain	.27	.47
Ireland	.36	.45
Denmark	.37	.39
Italy	.32	.38
Portugal	.19	.28
Greece	.13	.24
EU-12	.38	.45

Source: TRAILL B. (1997), 'Globalization in the food industries', in *European Review of Agricultural Economics*, Vol. 24, pp.390-410.

More specific for the European Dairy industries, PIERI *et al.* (1997) calculated Grubel-Lloyd Index figures for the intra-industry trade between various EU member countries (see Table 9). The figures show that, at least for dairy products, European trade integration is not so homogenous as the figures in Table 8 might suggest. In fact, two distinctive groups of countries with strong two-way exchange of dairy products can be identified (with coefficients being larger than 0.5 in each group). The first country group includes France, Belgium (incl. Luxembourg), The Netherlands, Germany and Denmark. The second group may be seen as the three Mediterranean countries, Greece, Spain and Portugal (*ibid.*, p.415). Furthermore, it can be seen that, in general, intra-industry between these two groups is rather weak, perhaps already indicating that geographical and cultural distance may play an important role for these trade patterns.

⁸ The *Grubel-Lloyd Index* is defined as $\frac{[(X + M) - |X - M|]}{(X + M)}$ where X = exports and M = imports of similar products. The index has the characteristic $1 \geq \text{GL Index} \geq 0$; with 0 = all trade is *inter-industry*; 1 = all trade is *intra-industry* (HENDERSON 1998, p.113).

Table 9: EU intra- industry trade in dairy products, 1992 (Grubel-Lloyd Index)

	F	B-L	NL	D	I	UK	IRL	DK	GR	P	SP
F		.82	.87	.97	.14	.75	.30	.94	.16	.41	.23
B-L			.67	.96	.12	.54	.04	.56	.03	.12	.45
NL				.61	.67	.74	.08	.86	.01	.79	.25
D					.07	.29	.07	.54	.18	.16	.21
I						.26	0	.09	.25	.27	.46
UK							.91	.14	.62	0	.53
IRL								.93	0	0	.09
DK									0	.50	.09
GR										.77	.96
P											.96

Source: Adapted from: PIERI R., RAMA D. & VENTURINI L. (1997), 'Intra-industry trade in the European dairy industry', in *European Review of Agricultural Economics*, Vol. 24, p.415.

The United States had even higher intra-industry index values within the North American Free Trade Area (NAFTA) for food products in 1994 than the European Union (see Table 10). Other food preparations was the food product category with the highest Grubel-Lloyd Index value (0.83) in the trade between the US and the EU, followed by fresh meat (0.77), breakfast cereals (0.71), and canned fruits and vegetables (0.71). Products that were mainly or exclusively traded one-way in 1994 were wines (0.11), soft drinks (0.05), pasta (0.02), cheese (0.01), and snack foods (0.0) (HENDERSON *et al.* 1996a, pp.50-51).

Table 10: US intra-industry trade with others, 1994 (Grubel-Lloyd Index)

Industry	NAFTA	European Union	Asian Tigers	South America
Other food preparations	.63	.83	.40	.58
Fresh meat	.89	.77	0	.12
Breakfast cereals	.89	.75	.15	.15
Canned fruits and vegetables	.56	.71	.43	.16
Frozen specialties	.04	.67	.78	0
Prepared fish and seafood	.38	.60	.35	.01
Frozen bakery products	.96	.59	.85	.04
Confectionery products	.91	.51	.85	.30
Canned fish and seafood	.76	.44	.98	.05
Peanut, olive, other oils	.49	.31	.57	.71
Distilled liquors	.12	.31	.05	.09
Canned specialties	.69	.28	.30	.26
Beer	.25	.19	.20	.14
Ice-cream	0	.18	.01	0
Bread and bakery products	.91	.16	.64	.33
Roasted coffee	.83	.15	.05	.02
Cookies and crackers	.96	.14	.50	.95
Chocolate products	.99	.13	1	.16
Frozen fruits and vegetables	.56	.13	.02	.03
Wines	.36	.11	.34	.12
Soft drinks	.98	.05	.22	.52
Pasta	.86	.02	.10	.19
Cheese	.38	.01	0	.56
Snack foods	.61	0	.07	0
Mean	.63	.34	.37	.23

Source: Adapted from: HENDERSON D.R., HANDY C.R. & NEFF S.A. (eds.) (1996), *Globalization of the Processed Foods Market*, US Department of Agriculture, ERS, Agricultural Economic Report #742, pp.50-51.

In conclusion, it becomes clear that trade in the same products at the same time can be both intra-industry and inter-industry, depending on the countries or trade blocs between which the products are exchanged. For example, pasta is traded almost exclusively one-way between the US and the EU, whereas almost completely in a two-way direction within the NAFTA. The same is true for frozen specialities, which were traded intra-industrially between the US and the EU and the US and the Asian Tiger states, however mostly inter-industry within the NAFTA and between the US and South America. Therefore, one should not conclude that processed food markets are globally connected, as high transport costs act as a significant barrier to very long-distance trade in many products, "which is the reason why most processed food trade is of an *intra-regional* nature (EU, NAFTA, East Asia)" (TRAILL 1997, p.396).

2.2.1.4 Prospects

Forecasts for the future significance of trade in processed and high-value foods are difficult. However, as long as the world population continues to grow, the aggregated global demand for food will also rise. A simultaneous increase in real incomes of the world population will support the shift to an increased demand for higher processed and value-added foods (OECD 1999, p.12).

A global perspective on food markets and trade in 2005 by ANDERSON *et al.* (1997) includes also processed food. The projections of the researchers are based on a modified version of the Global Trade Analysis Project (GTAP) database⁹⁹. Table 11 provides the main results, which show that world prices for processed foods are expected to decline by -0.4% and trade volume to rise by 53% from 1992 to 2005 as compared to a situation without the Uruguay Round agreements in 1995.

Table 11: World prices and trade volume by 2005 (% change) *

	<i>World Trade</i>	
	<i>Price</i>	<i>Volume</i>
Rice	2.1	147
Wheat	5.2	8
Coarse grains	2.3	32
Other Crops	2.5	13
Livestock products	4.1	25
Processed food	-0.4	53

Note: * As compared to a base case 1992 to 2005 without Uruguay Round agreements

Source: ANDERSON K., DIMARANAN B., HERTEL T. & MARTIN W. (1997), 'Asia-Pacific food markets and trade in 2005: a global, economy-wide perspective', in *The Australian Journal of Agricultural and Resource Economics*, 41:1, pp.19-44.

Even if these figures are only relative to the scenario without the Uruguay Round agreements, they do support expectations that the strong growth in processed food trade during the recent past is very likely to continue into the near and medium-term future.

⁹⁹ The GTAP model is an applied general equilibrium (CGE), multi-region model. For a detailed description of the GTAP framework see HERTEL (1996).

2.2.2 Foreign direct investment (FDI) in food industries

Total annual worldwide FDI expanded from US\$165bn to almost US\$350bn between 1973 and 1996, an increase by almost a factor of 17 (UNCTAD 1997). This equals an annual growth rate of more than 12%, starting from FDI stocks of US\$165bn at the end of 1973 to US\$3 205bn in 1996 (*ibid.*).

In the food industries, there is some evidence that foreign affiliate sales worldwide exceed processed food exports by the factor of 5 to 1 (VIATTE 1997). However, the investment and trade pattern can differ strongly from country to country, as VIATTE (1997) states:

Japan invests in food industries abroad but there has been virtually no penetration of Japan's market by foreign food companies. The US and the UK are active investors in other countries as well as hosting a significant amount of foreign investment. Canada and Germany are hosts to a significant number of foreign food companies but have not themselves invested much abroad. France is active as an investor abroad but the presence of foreign food companies in France is not so significant.

For selected European countries data on trade and FDI in processed foods is provided in Table 12 which support the fact that the extent of FDI differs greatly between countries. In addition, the table allows a comparison of the value of foreign affiliates sales and trade in food products in these countries. From 1988-91 the UK was the leading country with respect to foreign affiliate activity (US\$43.8bn as compared to US\$9.4bn of processed food exports), followed by the US (US\$40.4bn versus US\$19.1bn), and France (US\$30.6bn versus US\$19.8bn) (TRAILL & DA SILVA 1994). In Germany, food companies preferred exports (US\$15.9bn) to foreign direct investments (US\$2.9bn) and the same was true for Italy (*ibid.*). Also, in these two countries imports were higher than sales by foreign affiliates.

Table 12: Trade and foreign production of processed foods, US\$ billion, annual average 1988-91

	Out-bound sales		In-bound sales	
	Foreign affiliates	Exports	Foreign affiliates	Imports
United Kingdom	43.8	9.4	22.4	11.6
United States	40.4	19.1	60.7	12.7
France	30.6	19.8	11.7	9.0
Netherlands	21.8	19.0	14.3	6.2
Italy	3.2	7.0	6.1	6.9
Germany	2.9	15.9	8.7	13.0

Source: TRAILL B. & DA SILVA (1994), 'Trade, Foreign Direct Investment and Competitiveness in the European Food Industries', in *Structural Change in the European Food Industries*, EU Agriculture and Agro-industrial Research Programme, Discussion Paper #1, September.

The total food industry FDI outward stock of the most important western economies more than tripled between 1988 and 1997 (from US\$38.8bn to US\$134.2bn) (see Table 13). This increase was even over-proportional, as the share of food industry's FDI outward stock in total FDI outward stock gained from 3.8% in 1988 to 4.2% in 1997. The countries which expanded their outward FDI stock most were France (from an 7.5% share in total food industry FDI outward stock in 1988 to 10.8% in 1997) and the Netherlands (from zero in 1988 to 12.7% in 1997). The countries with the biggest relative losses were the US (from 43.7% in 1988 to 31.8% in 1997) and the UK (from 39.4% to 32.7%). For Germany, Italy and Japan their relative positions did not change much.

Table 13: Food industry* FDI outward stock, and shares in total FDI stock, 1988 and 1997
(values in US\$ million and shares in %)

Year	UK	US	Nether-lands	France ^a	Japan	Italy	Germany	Total	Share in total FDI
1988	15 292	16 973	-	2 915	1 971	1 051	627	38 829	3.8
% of total	39.4	43.7	-	7.5	5.1	2.7	1.6	100.0	
1997	43 837	42 660	17 104	14 450	10 213	3 685	2 249	134 198	4.2
% of total	32.7	31.8	12.7	10.8	7.6	2.7	1.7	100.0	

Notes: * Including beverages and tobacco.

a France's manufacture of food also includes some agriculture.

Source: Adapted from UNCTAD (1999), *World Investment Report 1999 — Foreign Direct Investment and the Challenge of Development*, United Nations, pp.426-429.

The world's food industry inward stock and inflows both grew strongly in absolute terms between 1988 and 1997 (see Table 14). Relative to the total FDI inward stock and inflows, however, the food industry's significance decreased, as global food industry's inward FDI grew slower than the total aggregate. In particular, in developing countries the food industry's FDI inward stock grew only under-proportionally, thus, in 1997, representing only 1.7% of developing economies' total FDI stock, as compared to 4.7% in 1988. In developed countries, however, the food industry's share even increased, from 3.4% of total developed countries' FDI in 1988 to 3.6% in 1997. In 1997 the food industry's FDI inflows were relatively weak, as they represented in all areas a smaller percentage of the areas' total FDI inflows than in 1988. Overall, it becomes clear that most of the food industry's FDI comes from developed countries and also goes into these countries. And, whereas the seven most important food industry investor countries were able to strengthen their position between 1988 and 1997, the global growth of food industry FDI has been slower than the total aggregate's one. This means — although worldwide FDI in the food industry has absolutely been growing — it has at the same time been a below average growth, with an increasing concentration on a handful of investing nations.

Table 14: Food industry* FDI inward stock and inflows, and shares in total FDI, for selected regions 1988 and 1997 (values in US\$ million and shares in %)

Year	Developed countries ^a				Developing economies				World ^b			
	Stock		Inflows		Stock		Inflows		Stock		Inflows	
1988	24 654	3.4	5 502	5.9	5 255	4.7	974	3.7	29 909	3.6	6 476	5.4
1997	65 747	3.6	4 495	2.3	16 455	1.7	5 420	3.3	82 202	2.9	9 915	2.8

Notes: * Including beverages and tobacco.

a Based on FDI inflows to France, Germany, Iceland, Netherlands, Sweden, UK, and the US that accounted for 71% of total inflows to developed countries in 1988, and on inward stock in Australia, Austria, Canada, Germany, Iceland, Italy, Norway, Switzerland, UK and US that accounted for 76% of total inward stock. For 1997 including also FDI inflows from Belgium/Luxembourg, Canada, Denmark, Italy, Norway and Switzerland that accounted for 83% of total inflows to developed countries, and inward stock also from Finland and Denmark that accounted for 81% of total inward stock.

b Not including Central and Eastern Europe.

Source: Adapted from UNCTAD (1999), *World Investment Report 1999 — Foreign Direct Investment and the Challenge of Development*, United Nations, pp.418-425.

The world's top transnational food corporations in 1998 are listed in Table 15. As it becomes clear, the world's largest food companies are also the most internationalised, and their headquarters are all located in western economies. The message resulting from the table may also support the argument that most of the global food brands are owned by a handful of very large corporations, which operate truly internationally.

Table 15: The world's top transnational food and drink corporations, ranked by foreign assets, 1998 (US\$ billion and number of employees)

Corporation	Country	Industry	Assets		Sales		Employment		Index (%) [*]
			Foreign	Total	Foreign	Total	Foreign	Total	
Nestlé SA	Switzerland	Food / beverages	35.6	41.1	51.2	52.0	225 665	231 881	94.2
Unilever	Netherlands/UK	Food / beverages	32.9	35.8	39.4	44.9	240 845	265 103	90.1
Diageo Plc	UK	Beverages	27.9	46.3	10.5	12.4	65 393	77 029	76.7
Seagram Company	Canada	Beverages / media	18.8	22.2	9.1	8.7	-	24 200	94.8
Coca-Cola Company	US	Beverages	14.9	19.2	11.9	18.8	-	29 000	70.6
McDonald's	US	Eating places	12.0	19.8	7.5	12.4	-	284 000	60.7
RJR Nabisco Holdings	US	Food / tobacco	-	28.9	5.6	17.0	-	74 000	36.9
British American Tobacco Plc	UK	Food / tobacco	10.5	12.4	13.8	15.3	99 204	101 081	91.0
Danone Groupe SA	France	Food / beverages	10.3	17.6	8.8	14.4	58 602	78 945	64.6
Compart Spa	Italy	Food	10.2	21.6	10.5	15.0	24 097	33 076	63.4

Note: ^{*}The index of transnationality is calculated as the average of three ratios: foreign assets to total assets; foreign sales to total sales and foreign employment to total employment.

Source: Adapted from UNCTAD (2000), *World Investment Report 2000 — Cross-border Mergers and Acquisitions and Development*, United Nations, pp.72-74.

In summary, it becomes clear that overall FDI by food producing companies is much more significant than global trade in food products, but this is not equally true for all countries. The importance of foreign direct investments is therefore limited to only a few, mainly Anglo-American, countries. However, in recent years, their position has suffered, and in particular France and the Netherlands have emerged as new and increasingly important foreign food industry investors. Moreover, recent data suggest that FDI in the food industry, although in absolute terms strongly growing, has relatively grown slower than the total FDI average. Also, only a few western countries are the main food industry investors, and these countries were able to increase their significance even more during 1988 to 1997. And, most of the food industry's investments go to developed countries, thus causing developing countries — similar to the international trade situation — to lag more and more behind.

2.2.3 *Summary*

World trade in consumer-oriented foods (processed and high-value products) has grown significantly during the last decades. In addition, trade in these products now represent the largest part of the value of global agricultural shipments, thus making that trade in bulk agricultural commodities can no longer be taken as a valid indicator for the world's total agricultural trade.

The European Union is the most significant supplier of these food products, with France, the Netherlands, Germany, the UK, and Italy all being within the eight leading exporters of consumer-oriented food in 1996. If some basic agricultural commodities and tobacco products are also included, the US was the largest food exporter in that year. However, in using a more suitable aggregation, which includes processed foods, beverages and fats only, France and the Netherlands end up far ahead of the US. In net exports and per capita terms, the Netherlands seems the most competitive consumer-oriented food exporting nation, followed by France and Australia.

The export structure of leading food product trading nations reveals that diversity, i.e. non-specialisation in only one or two food categories, seems important for gaining a leadership position. A ranking of leading countries by per capita exports of processed food, beverages and fats suggests a positive relationship between per capita exports and the extent of diversity in the exported food categories. In fact, for the most successful export countries none of the shares of individual food categories exceeded 29% (France) and 26% (Netherlands) in total food and beverages exports in 1996. Thus, the world's leading food product export nations do not specialise in a few food categories but they offer a wide array of different product categories.

The most important consumer-oriented food products that were exported worldwide in 1994-95 were meat, followed by alcoholic beverages and fruit and vegetables. Fish and fish preparations were the products in which developing countries hold the highest shares in world exports. The products with the highest annual growth rates, apart from shell fish fresh, frozen, are all highly processed, such as food and cereal preparations, non-alcoholic beverages and chocolate and sugar products.

In OECD countries, which represent the developed world and therefore the largest part of the world economy, growth in processed food trade has been much higher than exports and imports of basic agricultural commodities during the period from 1980-82 to 1990-92. Processed fruit and vegetable products and oils and fats were the main imported processed food items; dairy products and prepared cereal products the main processed export goods. The highest annual growth rates in processed foods imports were achieved by food preparations and cereal preparations, and at the export side in cereal preparations and coffee, cocoa and chocolate products.

Intra-industry trade, i.e. the simultaneous exchange of similar goods between two countries, made up almost half of the trade of the European Union in food and beverages in the early 1990s. Belgium, Germany, the Netherlands, and France traded even more than 50% of their foods in the intra-industry type of trade. Between the US and the EU, intra-industry trade was especially important in food preparations, fresh meat, breakfast cereals and canned fruit and vegetables, whereas for wines, soft drinks, pasta, cheese

and snack foods trade was mainly of the inter-industry type. However, these trade patterns depend on the countries or trade blocs between which products are exchanged rather than on the products themselves. This can be explained with reference to the existence of high transport costs which may act as a significant barrier to very long-distance trade in many products and thus resulting in the fact that most processed food trade is of an intra-regional nature (EU, NAFTA, East Asia).

Prospects for future trade in consumer-oriented, processed and high-value foods are positive. World food demand is expected to rise with a further growing world population and the likely increase in real incomes for most of the world population supports the shift to more processed and value-added foods. Comprehensive quantitative studies support this view in predicting strong growth in trade in processed foods.

Foreign direct investments in food industries have expanded strongly during the past and, as a result, today's foreign affiliate sales worldwide exceed processed food exports by about a factor of 5. However, not in all countries is FDI equally important: it is mainly found in a few, mainly Anglo-American, countries. Nevertheless, in recent years, France and the Netherlands in particular have emerged as new and increasingly important foreign food industry investors. Moreover, recent data suggest that FDI in the food industry, although in absolute terms strongly growing, has relatively grown slower than the total FDI average. Also, globally, only a few — western — countries are the main food industry investors, and these countries were able to increase their significance even more during 1988 to 1997. And, most of the food industry's investments go to developed countries, thus leaving developing countries — similar to the international trade situation — more and more behind.

2.3 Justifying and explaining international activities of food product industries

The explanation and justification of international trade is a major topic in economics, and this has been the case from the early beginnings of this academic discipline. However, theories to explain international trade have also been developed outside the traditional school of international economists. The most prominent and successful attempt has probably been PORTER's (1990/98) concept of National Competitive Advantage. A fundamental problem with traditional trade theory is that, until recently, no focus has been given to product specific considerations which can crucially influence causes for international trade. Only KRUGMAN (1994, p.1) stressed this shortcoming in claiming that "conventional trade theory views world trade as taking place entirely in goods like wheat; new trade theory sees it as being largely in goods like aircraft". One may put forward that modern food products do not belong to either of these two categories. They are somehow in between. This may explain why sector specific agricultural economists and agribusiness specialists have argued that one single theory could not capture the whole complexity of international food trade anyway (ABBOTT & BRED AHL 1994; SHELDON & ABBOTT 1996; KENNEDY *et al.* 1997; PADBERG 1997). In fact, a coherent and vertical theoretical framework that would be able to incorporate the various aspects and product specific considerations of food product trade, starting from a food trade policy point of view, via the analysis of food industry competitiveness, down to the international marketing mechanics of modern consumer food products, has not been constructed so far. Therefore, existing theories can only be reviewed and relevant parts from them be adapted to the special conditions of the international trade in food products.

The following section therefore presents these existing theories, but also describes a new approach in exploring theoretically, and empirically for the case of Germany, the role of foreign demand and the contribution of international migration and tourism to international trade in food products. Furthermore, economic theories to explain foreign direct investment (FDI) in the food industries will also be discussed. Finally, all findings and conclusions will be represented in a concentrated form in the chapter summary.

2.3.1 *International trade in food products - Why it is beneficial*

The exchange of goods has always been a natural part of human activities and many people acknowledge the mutual advantages resulting from it, but *international* trade has usually been treated differently and with more caution. Today many people seem to take the gained utility resulting from the international availability of appreciated products such as tropical beverages (coffee, tea) and fruit (bananas) for granted while, at the same time, wondering whether we really need for example beef or cheeses imported from various origins, apples from the other end of the globe, chocolates from all over the world, or the whole huge and confusing international variety of wines and beers. It seems therefore worthwhile to review the main benefits deriving from international trade in general, and to specify them for the trade in food products in particular.

Political reasons that justify international trade can be seen in its potential to promote political stability and in particular to maintain and to generate peace among nations (WTO 1998, p.37). For example, US president Truman argued in 1947 that "trade and peace are inextricably linked" (*ibid.*). There is also a saying that claims that "two nations trading bushels are less likely to trade bullets" (KOHLS & UHL 1998, p.115). At least three reasons exist as to why trade and peace are closely inter-related, and why

integration through trade promotes world peace (WTO 1998, p.37): (1) Trade reduces the likelihood of conflict by establishing vested interests in the welfare and prosperity that were generated through trade. (2) Trade brings information about other countries and cultures and builds relationships among people across countries. (3) Trade helps to build peace-oriented structures, including international rules. In short, mutual beneficial contact promotes co-operation, not conflict (*ibid.*). These reasons seem especially true for food products, most of which can be considered as "culturally-bound goods" (CARTER 1997). To the extent of which people learn about and start to appreciate foods from other countries, closer relationships between cultures can be created.

Traditional economic welfare gains can be divided into two sources: (1) those deriving from pure exchange and (2) those resulting from mutual specialisation (WTO 1998; MARKUSEN *et al.* 1995, pp.61-75). Through the exchange of goods peoples gain because trade enables them to expand their consumption possibilities, i.e. a country can *choose a consumption pattern that is closer to the preferred one* and that may be different from the one determined by domestic production possibilities based on given resources. In an autarky, only that can be consumed what the country is able to produce. Gains from mutual specialisation arise because it allows *to use available resources more efficiently*. Specialisation in production makes sense when differences in either production technology (Ricardo case) or factor endowments (Heckscher-Ohlin case) exist. From these differences result comparative advantages in production, i.e. the ability to produce cheaper (more efficiently) than others. Mutual specialisation in the manufacturing of goods that offer comparative production advantages thus increases total production efficiency.

For example, one might imagine the case of Germany producing beer and of Costa Rica growing bananas.¹⁰ German consumers may not be happy with beer alone and Costa Rica's inhabitants may have many more bananas than they can consume. When both countries start to exchange beer for bananas, total utility is likely to increase because now both countries' consumers can consume food products that have not been available before, and producers are able to expand their markets. Furthermore, it seems reasonable from a cost and experience point of view that the two countries do not engage both in the production of beer and bananas. This because it would be cheaper for both countries to specialise in the product that they are able to produce more efficiently. In fact, even if transport costs for beer and bananas over such a long distance were high, trading the food products will likely turn out being cheaper for each country than if Germany tried to grow its own bananas and Costa Rica started to experiment with brewing technology. However, this is only a very simple example.

In reality, the situation may be much more complex, e.g. local producers come to be threatened by cheap imports and will end up as losers from international trade. The use of trade policy instruments, such as tariffs, quotas, etc. complicates the situation even more and the total welfare effect is then much more difficult to determine. However, empirical studies have confirmed that free trade leads to an overall welfare optimum and that any diversion from it reduces total economic welfare¹¹ (WTO 1998, p.39). In fact, this should be obvious, as presumably countries would not trade with each other anyway if

¹⁰ This example is derived from the standard two-goods two-countries case of basic trade theory, based on the Heckscher-Ohlin model which can be found in every international economics textbook (see e.g. MARKUSEN *et al.* 1995, p.61-75).

¹¹ For example, HUFBAUER & ELLIOT (1994) have estimated the potential consumer gain if the US eliminated all tariffs and quantitative restrictions at about 1.3% of US GDP in 1990. For Japan, the potential consumer gain from liberalisation was estimated between 2 and 4% of GDP (SAZANAMI *et al.* 1995).

there weren't any gains from it for both sides (MARKUSEN *et al.* 1995, p.218). Thus, alone the fact that trade occurs may be seen as a proof for the mutual benefits resulting from it. This should actually be clear, since aggregate trade flows are the sum of voluntary individual transactions, each of which is subject to rational decisions from both parties of the deal. Every individual international business transaction will only take place, if it offers mutual benefits for both bargaining parties. If any individual voluntary international trade deal brings along benefits for the involved business partners, why then should the sum of all these transactions not be positive?

Further economic welfare gains result in markets (countries) where imperfect competition is present or where production technology allows the exploitation of economies of scale (WTO 1998): (1) opening up monopolistic markets to trade will most likely provoke competition and lead to lower prices. (2) economies of scale in production can be exploited when international trade leads to higher outputs as additional foreign markets are served. As a result, more products become available for consumers and unit production costs (and prices) fall as fixed costs are spread over a higher output (KRUGMAN & OBSTFELD 1997, pp.133-136). This is true under the condition that consumers in total actually consume more as compared to the situation without trade. More likely, however, it may be the case that consumers have fixed incomes and they do not increase their total consumption significantly. Then, the opening up of markets will lead to an international concentration process among producers leading to a fewer total number of producers as compared to the autarky situation however, the remaining are able to realise higher outputs and, due to economies of scale, they produce with lower per unit costs and they will consequently sell cheaper products. Thus, international trade can increase welfare by lowering overall production costs. (3) A greater variety of goods available for consumers can lead to an increase in (consumer) welfare. On the one hand, variety *per se* may increase utility as consumers gain by having a greater choice of products¹² [*love for variety* concept of DIXIT & STIGLITZ (1977) and KRUGMAN & HELPMAN (1985)]. On the other hand, a greater variety of goods can increase the likelihood for an individual consumer to find her "ideal" product specification which maximises her utility [*ideal variety* concept of LANCASTER (1979)]. For LANCASTER (1991, p.9) optimal product variety in an economy is "determined as a balance between gains from greater variety and losses from smaller scale production". However, some have argued that, in general, rising variety itself is subject to diminishing utility returns (BRESNAHAN & GORDON 1997, p.12), and that more variety may also lead to increased social costs¹³ (KOHLS & UHLS 1998, p.169). LANCASTER (1991) himself abstracts in his assumptions on gains from product differentiation from "search and information costs, and disutilities of uncertainty or consumer confusion in the face of variety" (p.155). Empirical research has

¹² A simple model to demonstrate that a greater variety in available goods will result in higher consumer utility is provided by MARKUSEN *et al.* (1995, p.191-192):

$$U = n \cdot X^{\alpha}, \quad 0 < \alpha < 1$$

where U stands for Utility, n is the number of varieties and X the amount consumed of each variety (while assuming that each variety is consumed to the same amount X , therefore a subscript i can be omitted). The range of the exponent α secures decreasing marginal utility. If the number of varieties in a country is doubled, without changing overall output (i.e. the amount of output of each variety is now only half), the new utility level will rise:

$$U_{new} = (2n) \cdot \left(\frac{X}{2}\right)^{\alpha} = 2^{1-\alpha} \cdot nX^{\alpha} > nX^{\alpha} = U$$

Thus, consumers gain from higher diversity.

¹³ KOHL & UHLS (1998, p.169) specify economic cost as a result of higher variety by arguing: "However, product differentiation can also complicate consumer choices by substituting non-price for price competition. Differentiation may also increase prices and company profits, provide the illusion of product differences where none exists, and generally insulates sellers from the discipline of price competition".

shown that with rising incomes the demand for variety in general increases (THEIL & FINKE 1983). This has also found to be true for food consumption (at least in the US), i.e. the more available income consumers have the more diversified their diet will be (SHONKWILER *et al.* 1987). However, FAO (1996, Table 3 in Appendix 2, and pp.29-30) data shows that this is not necessarily true for all developing countries. For example, measured by the share of the major food groups in total dietary energy supply — which the FAO uses as a measure of the extent of diversification in national diets — Uganda, Rwanda or the Central African Republic show similar patterns as e.g. the much richer countries of Italy or Portugal. Variety in food consumption is therefore *not only* a function of income, but it is also determined by the degree of diversification of locally available foods. In absence of this variety, trade can compensate, and with increasing incomes, transportation and other trading costs will become less prohibitive. In summary, however, the discussion on welfare gains resulting from a greater variety of goods as a result of international trade can be seen as an extension of the traditional economic welfare gains of greater consumer choice resulting from the pure exchange of goods (see above).

As an example of further economic welfare gains from trade, one might imagine a closed German market with only one producer of rolled oats, the traditional breakfast cereal. Then international trade is allowed and British-made corn flakes enter the market at half the price of the rolled oats. As a result, and given the substitutability of both products, the price for the rolled oats is likely to fall (assuming that it contained a considerable monopoly rent component before). British consumers may also gain, as corn flakes producers now can achieve higher output which under the assumption of economies of scale will lead to a decrease in unit production costs and price (assuming that producers are actually willing to reduce prices). But even if British corn flakes manufacturers decided to differentiate the price for their products internationally and enter the German market with about the same high price level than that paid for rolled oats, German consumers would gain, as they typically prefer to have corn flakes *and* rolled oats to not having any choice at all.

In summary, three points need to be stressed: (1) In general consumers will benefit most from international trade in food products. They gain through a greater variety of available food products and very often through cheaper prices as compared to the autarky situation.¹⁴ (2) For producers welfare gains from trade liberalisation are not certain. On the one hand foreign manufacturers can gain access to foreign markets, but on the other hand there is also the risk that home producers may lose domestic customers to foreign competitors. This may be especially true for food products markets in industrialised economies, where income cannot be considered as a limiting factor for food demand anymore. Markets are saturated because consumers are not hungry anymore and thus, with stagnating population growth, total demand for calories does not increase further. This fact actually is just what Engel's law predicts and it can be seen as a consequence of man's physiological disposition that calorie intake has, apart from a critical lower boundary, also an upper one (TANGERMANN 1986, pp.65-66).¹⁵ As a consequence, for every foreign food product that enters a domestic market, a local one may not be sold. Thus, inefficient producers are driven out of the market as a result of increased competition due to international trade. However, this may be seen as beneficial from a market hygiene point of view. (3) Society, finally, may gain when peoples move closer

¹⁴ It is abstracted here from the in a developed country rather unlikely case that food is exported to an extent that it becomes scarce and as a result prices rise.

¹⁵ In fact, it has been empirically shown that with rising income (per capita GDP), income elasticities of food demand approach zero or become even negative (see TANGERMANN 1986, p.73).

together as a result of international trade. With each foreign food product that domestic consumers start to appreciate (take Italian pasta or French wine as an example), mutual understanding may grow and thus the risk of conflict be reduced.

2.3.2 *Explaining international trade in food products*

This sub-section reviews the main existing theories which have been developed to explain international trade. Traditionally, no focus has been given to product (i.e. industry-) specific determinants that may influence the level and pattern of international trade. However, in the following, the existing theories will be discussed in a food industry specific context, i.e. they will be supplemented with relevant and recent empirical findings on international trade in food products. In particular, traditional trade theory, new trade theory, and PORTER's (1990/98) theory of national competitive advantage will be discussed. As all these existing theories seem not to be able to fully explain international trade in food products, the role of foreign demand and the contribution of international migration and tourism to this kind of trade will be explored theoretically. For the case of Germany, the theoretical findings will be tested empirically. In order to understand the empirical results — based on time series econometrics and using error-correction models — one sub-section will also deal with econometric theory. Aspects of trade protection such as tariffs, quotas, non-tariff barriers and other political influences on trade (e.g. the behaviour of lobby groups), which can distort international trade substantially in the real world, will not be treated in a general way in this study. However, some of these aspects — relevant for the food industries — will be referred to in Chapter 2.4.

2.3.2.1 Traditional trade theory and comparative advantage

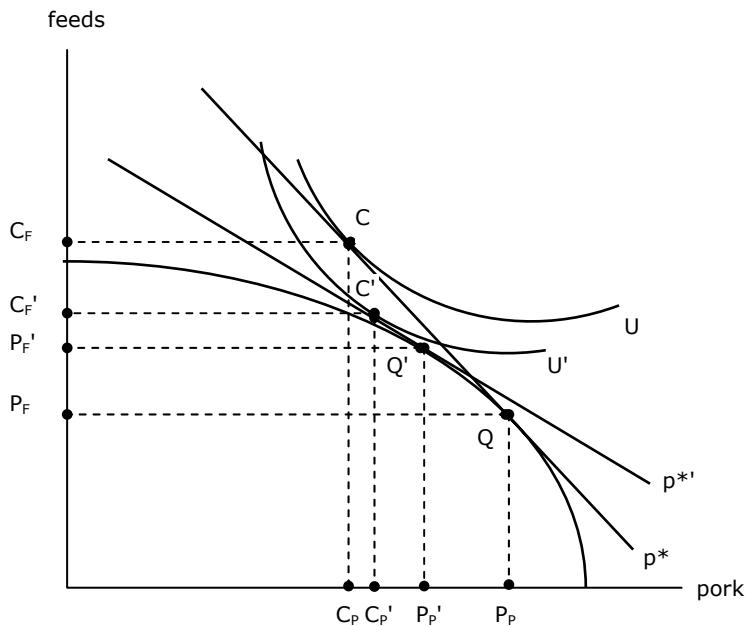
Traditional trade theory is mainly preoccupied with the production side determinants of international trade (MARKUSEN *et al.* 1995, p.196). Moreover, traditional trade theory tries to explain how economies actually *should* trade in order to render the global economy efficient,¹⁶ i.e. it has normative character (ETHIER 1996, p.51). Thus, not surprisingly, economists have failed until now to confirm empirically the traditional theoretical expectations (*ibid.*, p.66). The most prominent case is the so-called "Leontief Paradox"¹⁷. This may underline the fact that real-world trade is far more complex than traditional trade theory suggests. However, since it is the most developed theoretical framework which is in particular useful for analysing the issues of trade policy and the welfare implications of international trade (see e.g. VOUSDEN 1990), its fundamental ideas must be described here.

¹⁶ It examines under which production conditions trade reproduces the "integrated economy", i.e. a theoretical world in which all factors of production are perfectly mobile (HELPMAN & KRUGMAN 1985, p.5), and where production and exchange are organised on a global scale and in a way that world production becomes most efficient.

¹⁷ The Leontief Paradox resulted from surprising empirical findings on the factor contents composition of US exports and imports in 1947, in a study conducted by Wassily Leontief. Contrary to theoretical expectations the capital-labour ratio of US imports exceeded that in US exports by some 23%, although the US in that time was unquestionably the most capital-abundant nation in the world and it was certainly labour-scarce relative to the rest of it (see MARKUSEN *et al.* 1995, p.220-225).

Comparative advantages in production are seen as the cause of why goods are exported (or at least why they *should* be exported). Traditional trade theory builds mostly on the Heckscher-Ohlin framework¹⁸ which argues that comparative advantages of production arise because nations are differently endowed with production factors such as human, physical and financial resources¹⁹, and the opportunity cost of using these factors to produce (and to market) different goods (MARKUSEN *et al.* 1995, pp.98-126). The Heckscher-Ohlin theorem then states that a country will export the commodity the production of which uses the factor intensively with which the nation is relatively abundantly endowed (*ibid.*, p.106).

Figure 6: Heckscher-Ohlin approach to explain the Netherlands' strength in exporting pork



Source: Author's draft. Terminology adapted from MARKUSEN J., MELVIN J., KAEMPFER W. & MASKUS K., *International trade: theory and evidence*, 1995.

For example, a small country such as the Netherlands, which in 1996 was an exporter of pork and a net importer of animal feed (see Table 4), may be seen as comparatively poorly endowed with land. However it is rich in population and thus available labour. Pork production may be seen as more labour intensive²⁰ than the production of feeds. In Figure 6 this situation is illustrated by the shape of the *production frontier* (transformation curve) which is biased towards pork production, i.e. the more labour-intensive good. World market prices are in favour of pork (indicated through the slope of the *national budget line* $p^* = p_{\text{pork}} / p_{\text{feeds}}$), i.e. the price of pork is high relative to the price of feeds. The world price ratio p^* determines the production levels of pork (P_P) and feeds (P_F) at point Q where the budget line is tangent to the production frontier²¹. The countries' aggregate consumption preferences are given by the

¹⁸ Apart from the Heckscher-Ohlin approach, the *Ricardo Model* is based on differences in production technology as the source of comparative advantages of nations. A third approach, the *Specific-Factors Model*, deals with the — in contrast to the Heckscher-Ohlin Model — more realistic assumption of partly immobile and industry specific factors (MARKUSEN *et al.* 1995). However, these two other models have by far not reached the same theoretical and empirical relevance than the Heckscher-Ohlin approach and thus they will not be discussed further in the following.

¹⁹ Special production factors for food processing or manufacturing are, dependent on the product which is to be produced, agricultural, horticultural, aquacultural or industrially produced inputs, as well as capital (specific machinery) and human labour to an higher or lesser extent.

²⁰ Consider here pork production as pig breeding plus slaughtering and boning.

²¹ This point is the producer optimum where the world price ratio p^* equals *MRT*, the *marginal rate of transformation*, i.e. the ratio of the change in output of feeds to the change in output of pork.

community indifference curve (U). Point C determines the chosen consumption level where U becomes a tangent in p^* .²² The Netherlands, due to their comparative advantage in production, and given the current world price ratio, produce more pork (P_p) than they consume (C_p) with the excess being exported. On the other hand, short of labour to produce the necessary amount of feeding stuffs, the difference between consumption (F_c) and production (F_p) must be imported. Thus, production possibilities resulting from fixed factor endowments *should* determine which goods are exported and imported, and world market prices determine the amounts traded. When world market prices change, e.g. a decline in the price of pork (indicated in Figure 6 by a shift of p^* to $p^{*'}$), the export pattern of a nation will change. With pork becoming cheaper, the price of feeds rises relative to the pork price. As a consequence, pork production becomes less and feed production more lucrative. Thus, the production pattern should change ($Q \rightarrow Q'$) with new amounts of pork (P_p') and feed (P_f') being produced. The new price ratio will also affect consumption levels, with the new amounts C_p' and C_f' being consumed. As a result, less pork should be exported by the Netherlands (as given by the differences $P_p' - C_p'$ and $F_p' - C_f'$), and less feeding stuffs imported.

In summary, for the international trade in food products traditional trade theory may be helpful only to understand trade in non-differentiated raw products such as *agricultural commodities*. For this purpose it has been used intensively during the past (SHELDON & ABBOTT 1996, p.2). In addition, the theory may also be appropriate when applied to the existing inter-industry kind of trade in high-value foods such as, typically unbranded, fresh fruit and vegetables, fresh meat and fish, or oils and fats.²³ Furthermore, comparative cost advantage in production may be important for intermediate products which are used as inputs for further processing/manufacturing in the food industries and where their price may be the most important purchasing factor. For the trade of highly differentiated consumer food products, however, "world market prices" may not be the major determinant, as non-price factors have become more and more important (REED 1994; PIERSON & ALLAN 1994; KENNEDY *et al.* 1997). Here another approach is needed to explain existing trade pattern. Furthermore, a fundamental problem with traditional trade theory is that it cannot explain why trade among industrialised economies has grown so enormously during the last decades, although these countries have become increasingly *similar* in their factor endowments²⁴. In addition, the trade pattern have changed and trade among industrialised nations is now increasingly of the *intra-industry* kind of trade (BALASSA 1986). This is also true for the international trade in food products, since in industrialised countries about 50% of these goods are now exchanged mutually between the same industries (see Section 2.2.1.3). Therefore, there was need for a new trade theory, able to explain these empirical facts.

²² Equal to Q , C represents the consumer optimum where p^* equals MRS , the *marginal rate of substitution*, i.e. the ratio of the marginal utilities of the two commodities.

²³ In fact, the increasing trade in fresh fruits between developing & second world countries and industrialised economies (OECD 1996) may be explained in that the former countries have the production advantage of being able to harvest their crops and to market them into the northern hemisphere when countries there are just in the off-season of fruit production. That is, they may have a "comparative advantage in harvesting time".

²⁴ See DOLLAR & WOLFF (1993) for an empirical illustration of this fact.

2.3.2.2 New trade theory and intra-industry trade

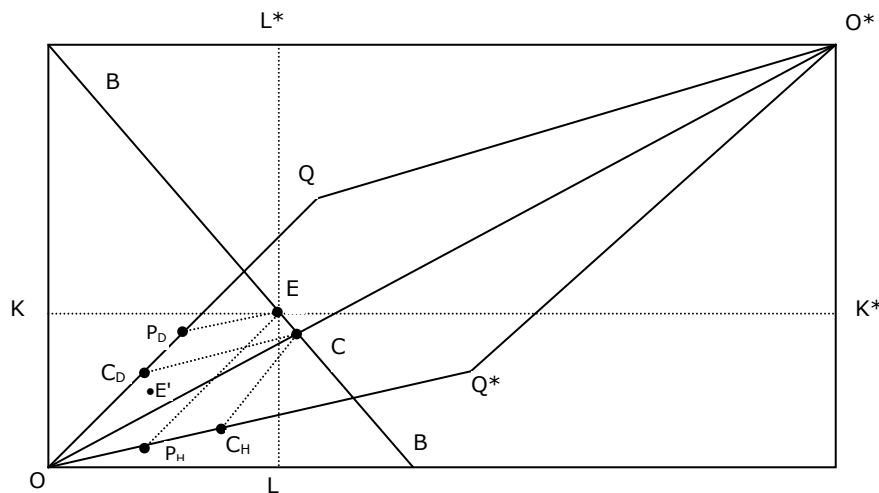
New trade theory is able to explain intra-industrial trade, i.e. the simultaneous exchange of goods, which are similar in terms of factor inputs and consumption, among countries or industries. Moreover, this "strategic" trade theory deals also with situations of imperfect competition as determinants of international trade, such a *monopolistic competition*²⁵ market structure or several oligopoly situations, such as *Cournot* or *Bertrand equilibria*²⁶. In order to be able to deal with such situations the assumption of a constant returns-to-scale production technology is relaxed.

A model of intra-industry trade within a monopolistic competition framework has been developed by KRUGMAN (1994)²⁷. He argues that production technologies with increasing returns-to-scale — by which many modern industrial activities such as car or aircraft production or computer industries are characterised — stimulates foreign trade, as entrance into foreign markets may lead to higher output levels with existing fixed costs spread over more units. Furthermore, KRUGMAN showed that in modern economies consumers gain utility through product variety which drives companies to engage in product differentiation. Within a closed economy the number of available varieties is constrained by the available labour supply, i.e. the size of the country. Concentrating the production on one or a few varieties would, under the assumption of economies of scale, lower overall production costs, but this would also go hand in hand with increased monopoly power for the producers of these few varieties. KRUGMAN showed that in such a situation an equilibrium exists where product prices must equal average production costs of the products. If the price were higher than average cost, then the resulting profits would attract new companies. Respectively, if the price were lower than average production cost, then the occurring losses would drive companies out of the market. In a larger economy the same number of manufacturers could produce larger outputs of the individual varieties, thus making to consumers available the same number of varieties at cheaper prices, or a higher number of varieties to an equal price level in comparison to a small economy. Intra-industry trade then would make the global economy more efficient, as it allows large-scale production of industrial goods which can be marketed internationally. Thus, by the means of intra-industry trade, and on a global scale, the same number of product varieties could be produced more cheaply. Therefore, a complete model for world trade must be able to explain both intra-industry and inter-industry trade since we know that in reality both types of trade occur.

²⁵ Monopolistic competition is a type of market structure which combines some elements of perfect competition (no strategic interactions between companies, free market entry) with some elements of monopoly (a company's control of its product prices), hence the model's name. With the production and marketing of differentiated products, a company is able to set prices for its products above marginal unit production cost, however, only within a limited margin, because other producers of similar products exist in the market (see KRUGMAN & OBSTFELD 1997, p.127-130; and PINDYCK & RUBINFELD 1995, p.413-417).

²⁶ *Cournot* and *Bertrand* models are special cases of a *duopoly* market structure with the difference being, that the former assumes that companies make output decisions taking into account an assumed output reaction by their competitors, whereas the later assumes that companies make price decisions based on an assumed price reaction by competitors (PINDYCK & RUBINFELD 1995, p.419ff.). Both models are able to explain intra-industry trade in homogenous goods.

²⁷ KRUGMAN (1994) is a collection of the author's earlier papers. In fact, much of his intra-industry theory was already developed in the 1980s and in co-operation with other economists. A simpler specification of his model can also be found in KRUGMAN & OBSTFELD (1997, p.121-158).

Figure 7: An integrated model of international trade

Source: Adapted from HELPMAN E. & KRUGMAN P., *Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy*, 1985, p.16.

An integrated model of world trade has been developed by HELPMAN & KRUGMAN (1985). Imagine a $2 \times 2 \times 2$ situation, i.e. a world with two countries, two goods, and two factors of production. Such a situation is described in Figure 7. It is an Edgeworth-Bowley box diagram, i.e. a graphical representation of resource allocation for two countries. There are two resources, capital K and labour L . E describes the distribution of the two resources for the two countries, home and foreign, i.e. home uses OL (OK) of the total labour (capital) supply and foreign O^*L^* (O^*K^*). The diagonal OO^* represents aggregate employment, and with appropriate units of measurement, it can be interpreted as world gross domestic product (GDP) (HIRSCHBERG *et al.* 1994, p.160). Furthermore, OO^* can be seen as a reference point for the countries' resource allocation. Since E is above OO^* , the home country is relatively capital rich. Drawing through E a negatively sloped line BB whose slope is w_L/w_K , where w_i is the reward to factor i , $i = L, K$ (or factor prices), and C is the intersection point of this line with the diagonal. Point C divides the diagonal into two segments that are proportional to the countries' GDP levels. Thus, following HELPMAN & KRUGMAN (1985, p.17), by constructing parallelograms between O and E , and O and C , it is possible to obtain a representation of the home country's production and consumption levels.

There are two industries, one producing a homogenous good under constant returns to scale, and the other producing n differentiated goods under an increasing returns technology, e.g. the food processing industry. OQ ($=O^*Q^*$) gives the vector of resources, i.e. the proportions of available labour and capital used in the differentiated goods sector. As the sector uses relatively more capital, it is assumed to be capital intensive. OQ^* is the vector of resources that are used in the homogenous good sector, which is labour intensive in production. P_D and C_D give the production and consumption levels of the differentiated product in the home country. Similarly, P_H and C_H give the production and consumption levels of the homogenous good. The home country imports the homogenous good and is a net exporter ($P_D - C_D$) of the differentiated product, while the foreign country is an exporter of the homogenous good and a net importer of the differentiated product. The concept of net trade flows in the differentiated good's sector follows from the fact that the home country produces and exports n varieties, and imports n^* varieties from the foreign country, where $n > n^*$ (see HELPMAN & KRUGMAN 1985, pp.18-19 for the precise specification of determining n). Thus, the share of intra-industry trade in total trade can be systematically related to differences in relative factor endowments.

Three testable hypotheses can be derived from the above model (see HELPMAN & KRUGMAN 1985, pp.169-78 and HIRSCHBERG *et al.* 1994, p.161). (1) The level of intra-industry trade will be higher (lower) the greater the equality (inequality) of relative factor endowments between countries. In Figure 7 the degree of equality is given by the distance of the endowment point E from the line of equal endowments, the diagonal OO^* . The more distant E is from this locus the more different are both countries in their factor endowments. With E moving towards OQ^* (i.e. the more capital intensive good, thus the capital-labour ratio increasing), the home country specialises more and more in the production of the differentiated good and produces less of the homogenous good. At the limit, with E lying on OQ , it will not produce the latter at all. Thus, with increasing inequality in the factor endowments of the two countries, both countries will specialise in the production of that good, which uses the factor of production more intensively, the country is comparatively better endowed with. This is another way of saying that the resulting trade will be inter-industry in nature. The opposite is true for the case where E moves closer to C on the OO^* line. At the limit, with E equals C , both countries will produce and exchange differentiated goods, i.e. all trade is intra-industry. As a country's income is a function of its capital-labour ratio in this model, the hypothesis can be restated as: the levels of intra-industry trade will be higher (lower) the greater the equality (inequality) of the countries' per capita GDP.²⁸ (2) The degree of intra-industry trade will be higher (lower), the smaller (higher) the relative size of the capital-rich country is, size being measured by GDP. To see this, imagine that the home country's size, which is determined by the endowment point E , reduces to E' where the country's GDP is smaller but the same capital-labour ratio is maintained. Now with a smaller home country, the level of intra-industry trade increases, i.e. the gap between P_D and C_D decreases. If instead the endowment point is on OO^* , where each country has the same capital-labour ratio, relative size does not matter and there is only intra-industry trade. (3) HELPMAN & KRUGMAN (1985) argue that, *a priori*, in more capital-intensive industries, relatively more differentiated goods will be produced. Consequently, it is expected that the degree of intra-industry trade for a specific country will be positively associated with endowments of capital available per worker, again measured by a country's per capita income (GDP).

For the global food processing sector these hypotheses were tested empirically by HIRSCHBERG *et al.* (1994). For the period of 1964-85 and a sample of 30 countries which imported 85-90% of the world's processed food exports during this period, the researchers estimated the strength of the effects of the inequality of two countries', j and k , per capita GDP [$INEQGDC_{jk}$], the relative size of country j 's GDP as compared to country k [GDP_{SIZE}_{jk}], and the value of the importing country j 's per capita GDP [GDC_j] on the bilateral intra-food industry trade, as measured by a weighted Grubel-Lloyd Index value [IIT_{jk}]. Furthermore, HIRSCHBERG *et al.* included also variables for exchange rate volatility between the trading partners j and k [DEX_{jk}], the transport cost between the two countries as a function of distance [$DIST_{jk}$] at various powers, and dummy variables for the membership in a customs union [EC_{jk}] or in a free trade bloc [$EFTA_{jk}$], for a common land border between country j and k [$BORDER_{jk}$], for country-specific, unobserved factors such as tariff and non-tariff barriers for importing country j [DRC_j] and exporting country k [DPC_k] respectively, and for year-specific effects [DYR] which account for influences not measured by the other variables. These variables were tested in a linear model using a weighted cross-section/time-series fixed-effects *Tobit* procedure, since more than 20% of country pairs with zero IIT_{jk} were present in the data (see *ibid.*, p.163 for details) The model was specified as

²⁸ HELPMAN & KRUGMAN (1985, p.171-2) showed that for any country j , $GDP_j = \pi(p, L_j, K_j)$, where π , p , L_j and K_j are profits, prices, labour and capital, respectively. Rearranging yields, $GDP_j/L_j = \pi(p, K_j/L_j)$.

$$IIT_{jkt} = \alpha_0 + \beta_1 INEQGDC_{jkt} + \beta_2 GDFSIZE_{jkt} + \beta_3 GDC_{jkt} + \beta_4 DEX_{jkt} + \beta_5 DIST_{jkt} + \beta_6 DIST_{jkt}^2 + \beta_7 DIST_{jkt}^3 + \beta_8 BORDER_{jkt} + \beta_9 EC_{jkt} + \beta_{10} EFTA_{jkt} + \sum_{j=1}^{29} \gamma_j DRC_j + \sum_{k=1}^{29} \lambda_k DPC_k + \sum_{t=1965}^{1985} \pi_t DYR_t + \varepsilon_{jkt}.$$

In contrast to a regression model, the usual R^2 -statistics is not applicable for a *Tobit* procedure, but the squared correlation between the predicted and the actual values (including zeros) was estimated as 0.64. Furthermore, *Tobit* parameters do not have the interpretation as derivatives of the independent variable with respect to the regressor. However, the sign of the derivative is the same as the sign of the estimated coefficients, and the t -tests on the coefficients are equivalent to the comparable tests on the derivatives (*ibid.*, p.164). Table 16 lists the estimated parameters.

Table 16: Estimated *Tobit* parameters for determinants of global* intra-food industry trade

Variables	Coefficient	t -statistics
INTERCEPT	-0.083	-8.793
INEQGDC	-0.151	-17.041
GDPSIZE	0.010	0.083
GDC	0.301	3.198
DEX	-0.012	-4.400
DIST	-0.048	-6.926
DIST2	0.045	7.721
DIST3	-0.011	-8.143
BORDER	0.146	78.743
EC	0.073	34.456
EFTA	0.039	17.349

Note: *30 countries, importing 85-90% of global exports in processed foods during the period 1964-85.

Source: HIRSCHBERG J.G., SHELDON I.M. & DAYTON J.R., 'An analysis of bilateral intra-industry trade in the food processing industry', in *Applied Economics*, 26, 1994, pp.159-167.

The empirical results suggest that, in general, the theoretical hypotheses of HELPMAN & KRUGMAN (1985) discussed above are proved to be true for global intra-industry trade occurring in the food industries. All three estimated coefficients of the tested GDP variables which are supposed to have a strong influence on bilateral intra-industry trade, display the correct sign but *GDPSIZE* not being statistically significant. The significant negative coefficient for the *INEQGDC* variable indicates that the larger the difference in per capita GDP of two countries, the lower the level of intra-industry trade. In addition, the positive coefficient on *GDC* suggests that the importing country's per capita GDP has a positive influence on the level of bilateral intra-industry trade. However, the relative size of GDP of the importing country in relationship to that of the exporting one does not influence the level of bilateral intra-food industry trade significantly. The estimated coefficients of all other included variables are statistically significant and display the expected sign. The parameter on *DEX* indicates that exchange rate uncertainty negatively influences intra-industry trade. A common border between two trading partners or their membership in the EC or the EFTA effects the level of bilateral intra-industry trade positively, with the effect of a membership in the EC appearing about twice as large as a membership in the EFTA. The combined effect of the distance variables suggests that transport costs effect the level of intra-food industry trade negatively, but this effect (partly imposed though the cubic estimation form) depends itself on the distance between the trading partners (see *ibid.*, pp.164-5 for details). The fixed effects for country-specific influences have been estimated as particularly large and positive for the United Kingdom, the United States, Germany and the Netherlands,

both, as importers and exporters. The authors of the study argue that for these countries their result indicates the influence of other factors not included in the specification, but which are correlated with the *INEQGDC* and *GDC* variables. Finally, the estimated year-specific fixed effects indicate that global intra-food industry trade was indeed influenced by time-related international events such as the oil price shocks during 1973-78, for example. During this period a definite drop in the overall level of bilateral intra-industry trade could be identified (see *ibid.*, p.166 for details).

Detailed patterns of intra-industry trade in processed food for 49 individual food industries based on the same data set as above were published by HIRSCHBERG & DAYTON (1996). In using an equivalent model and the same variables, but instead of aggregating over all processed food industries, the researchers this time estimated regression coefficients for individual industries. Their results reveal that there are surprisingly great differences among these industries and that no clear pattern emerges which would allow for meaningful conclusions concerning the similarity of various food categories. Although the estimated parameters for *EC*, *EFTA* and *BORDER* are mostly significant and display the expected sign, there are great discrepancies in the *INEQGDC*, *GDPSIZE*, *GDC* and *DEX* variables. In only 27 of the 49 food industries are the estimated parameters for *INEQGDC* significantly negative and thus confirm *a priori* theoretical expectations. For a number of industries the parameters have been estimated with a positive sign, among them miscellaneous food products, macaroni, dehydrated vegetables and canned fish. The authors claim that for these industries trade may be better described by the traditional trade model for which countries have differing resource endowments (*ibid.*, p.148). Similarly, for the *GDC* variable which could be expected as positive, only 20 have been estimated as significantly different from zero and among them nine were negative, such as e.g. bottled soft drinks, cheese, sugar and candy, and miscellaneous food preparations. Exchange rate effects seem to be more consistent among the different industries, with only a few parameters displaying a positive instead of the expected negative sign. However, only 19 out of the 49 parameters have been found to be significantly different from zero. In order to classify the individual industries into groups with similar regression results, the researchers used a special cluster algorithm which divided the 49 industries into 10 groups with homogenous industries. However, the resulting clusters are, apart from their similarities in statistical qualities, rather incomprehensible from a product specific point of view. For example, the industries which yield the best results in explaining intra-industry trade according to the given model specification are canned vegetables, pickles, sauces and salad dressing, cake and pastry, cocoa products, salted, roasted nuts and seeds, cottonseed oil mills, vegetable oil mills, malt beverages and spices. Here the authors conclude that except for spices and salted, roasted nuts and seeds these industries "do not exhibit any environmentally based advantages" (*ibid.*, p.156), i.e. the processing of these foods are purely industrial activities that could be done anywhere regardless of location. To sum up, HIRSCHBERG & DAYTON claim that certain industries are more liable to engage in intra-industry trade and that in particular ten industries among the 49 have different characteristics of their intra-industry trade which may not be explained by the model specification used in their study. In general, the results illustrate that explaining international trade is crucially dependent on an industry-specific model, i.e. the more disaggregated the trade flows that are to be analysed the more industry-specific factors may need to be taken into consideration.

For the EU dairy industries another empirical study (PIERI *et al.* 1997) seems to confirm the argument of the importance of industry-specific factors that are needed to explain intra-industry trade in food products. PIERI *et al.* used country-specific and industry-specific factors to explain intra-industry trade flows of dairy products between 11 European Union member countries in the period 1988-92. The researchers argue that "country characteristics reflect demand conditions, whereas industry characteristics mostly focus on the supply side" (p.416). As country-specific variables PIERI *et al.* included, (i) an inequality index of two countries' per capita GDP as an indicator for "taste overlap" (p.416), (ii) the average (mean) of two trading partner's per capita GDP values as a proxy for their average development stage, (iii) the average (mean) GDP of two trading partners as a measure of their combined average market size, (iv) the existence of a common border as a dummy variable for market proximity, and (v) a trade imbalance indicator that controls for the bias in the Grubel-Lloyd Index which generally becomes smaller as the size of the trade imbalance increases. As industry-specific factors the researchers considered variables for product differentiation, market concentration, raw material availability, and economies of scales. Furthermore, two variables for the countries' retailing concentration and the degree of inequality between two trading partner's retailing structure were included, as PIERI *et al.* expected that intra-industry trade in dairy products would be higher between countries with high and similar levels of retailing concentration (p.420). As results the study finds that similar to HIRSCHBERG *et al.* (1994) the variable for the average combined market size turned out to be insignificant (PIERI *et al.*, p.421), whereas the inequality measure of two countries' per capita GDP was always estimated as significantly different from zero and with the expected negative sign. Second, the inclusion of the industry-specific factors improved the significance of the estimated models considerably with all of the included variables being statistically significant and very often showing the expected sign. Third, the incorporation of the retailing-specific variables also improved the model significantly, with the variables being themselves highly significant, however with the concentration parameter resulting almost always with an unexpected negative sign. To sum up, PIERI *et al.*'s study confirms that intra-industry trade in the food industries is higher the more equal two trading partners are. Furthermore it confirms that factors that cause intra-industry food product trade may be very different depending on the industry. Thus, product specific conditions should always be considered in the analysis of these trade flows.

One general problem with intra-industry trade exists, however. This problem is related to its definition as a two-way trade of *similar* products and to its measurement. Depending on the definition of a product category, intra-industry trade will be greater the more aggregated the analysed commodity group. Taking food as an example, it is obvious that almost all countries produce food and most of them may also export and imports foods, i.e. there will always be some degree of intra-industry trade. However, one country may export only cereals and the other only meat. Thus, if trade in cereals is to be analysed, no intra-industry trade will be found, although at the more aggregate food level it exists. Now let's assume both countries export meat products, but one country is specialised in the production of sausages whereas the other one may only produce corned beef. On the meat level there is intra-industry trade but on the sausage level there is none. The same may be true for dairy products, with one country being specialised in cheese making whereas another country may produce butter or milk powder. PIERI *et al.* (1997, p.412)

thus argued that intra-industry trade very much seems to be a statistical phenomenon, i.e. the measured level of intra-industry trade often tends to reduce as the level of data disaggregation increases. Moreover, and especially in the food sector, one needs to be aware of *inter-temporal* intra-industry trade, since some of the food production and trade is seasonal. For example, we know that many countries export fruit and vegetables when they are in season and shortly after the harvest season, but the same countries may equally import these commodities when they are off-season (OECD 1996; KANTOR & MALANOSKI 1997, pp.14-15). Thus, when analysing yearly trade figures, time-lagged exports and imports of the product category may appear as strong intra-industry trade, but in fact it is of a totally different nature as it can also occur between countries which are completely different in their income levels and factor endowments. A final problem is related to the Grubel-Lloyd Index itself. This measure is affected by the size of the overall trade imbalance between two countries and there is some discussion about whether to use the unadjusted or an adjusted version and about the way of how to adjust the index (see PIERI *et al.* 1997, p.416 and p.421). Thus, although it is obvious that a great deal of today's trade between industrialised nations is a two-way kind of trade in similar goods, it is much less easy to exactly determine the "real" extent of intra-industry trade, or to explain its causes.

In summary, intra-industry trade, or the simultaneous exchange of similar goods between countries, can theoretically and empirically be shown as occurring mostly between industrialised nations which are similar in their income levels and their factor endowments. For aggregated global food industries it was shown empirically that, in particular, similar per capita income levels and short transport distances together with the integration into a free-trade area or a common free market promote intra-industry trade, with the last factor confirming that international food product trade is mostly of intra-regional character, as already stressed before. At the level of individual food industries, however, these factors are not enough to explain the causes for intra-industry trade. Here it has been empirically demonstrated that industry-specific and related factors are necessary to gain a better understanding of what determines intra-industry trade in food products. For example, the level for EU intra-industry trade in dairy products is influenced by producer and retailer concentration, economies of scales in production and the availability of raw milk. In general, however, intra-industry trade may also be very much a statistical phenomena with the extent of this kind of trade increasing the more aggregated the analysed trade flows are, and seasonal effects (harvesting times) causing biases. Thus, even though the concept of intra-industry trade is a very useful one that expands the understanding of international trade considerably, it must, especially in the food industries, also be viewed with some caution.

2.3.2.3 Industrial competitive advantages

The theory of competitive advantages was developed by PORTER (1990/98)²⁹. Although, strictly speaking his theory is not an economic one but rather belongs to the international business and strategic management field, PORTER discusses the topic of national comparative advantage and sees his work as a complement to international trade theory. Given this different approach, economists have criticised his research on methodological grounds for the results not being based on testable hypotheses (VAN DUREN *et al.* 1994, pp.46-47)³⁰. However, PORTER's work has found much attention in the academic as in the business world and has undoubtedly widened considerably the understanding of how the international economy actually works. In particular in the agricultural sector, PORTER's ideas have found widespread acceptance (see e.g. HARTMANN 1993, BREDAHL *et al.* 1994, KENNEDY *et al.* 1997, HENDERSON 1998, DRESCHER & MAURER 1999). Therefore, PORTER's theory needs to be included in this study in order to explain in a comprehensive way international trade in food products.

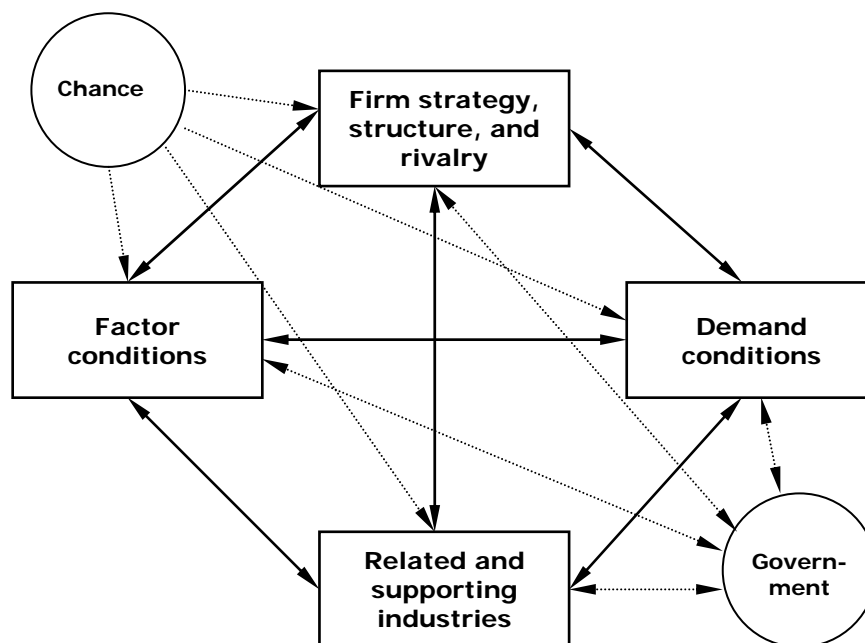
PORTER's main arguments are (1) that factors of production (such as labour, capital, natural resources or know-how), which in the traditional trade theory are seen as the sources for comparative advantage, are in today's internationally integrated economies increasingly mobile, i.e. in case of a lack of (one of) them, they may be acquired from the world market. That is, he sees factor endowments not as "God-given" and unchangeable but as *manageable* in the sense that factor endowments are only one input variable among others, which are important in order to gain international competitiveness.³¹

(2) PORTER put forward that in international markets, individual companies compete rather than nations. Thus, although a country may have a comparative advantage in the production of a certain commodity, we know that — in reality — within the same industry of a country there are generally competitive companies and non-competitive ones. That is, comparative advantage in production resulting from relative factor endowments does not necessarily lead to competitive advantages for every company. There is a whole set of conditions that must be fulfilled in order to gain success in international markets. PORTER specifies these determinants, and their graphical visualisation is known as his "national diamond model" (see Figure 8).

²⁹ PORTER's *The Competitive Advantage of Nations* (1998) is a new edition of the same book which was originally published in 1990. The 1998 edition is, however, complemented with a new introduction and therefore in the following only the new edition will be referred to.

³⁰ PORTER conducted an in-depth case study of relatively sophisticated, internationally operating industries and industry segments in 10 countries that accounted for over 50% of world trade in 1985. In classifying these industries into clusters according to their shares in their countries' exports and their shares in world cluster exports, PORTER aimed to identify "successful" and "unsuccessful" industries.

³¹ *Competitiveness* (or competitive advantages) according to PORTER results from the difference between the value a company is able to create for its buyers and the cost of creating that value. *National* competitiveness then occurs when a sufficient number of companies create the means for sustainable positional advantage, and generate enough profit to finance the private and public sector's role in achieving their responsibilities. There are, however, many different definitions of competitiveness depending on the level in which the economic agent(s), to whom the definition is applied to, operate(s) (company, industry or country level), the particular market in which the economic agent operates (commodity or differentiated products), and the purpose of the definition (i.e. for policy, sector productivity, or export performance analysis, etc.) (ABBOTT & BREDAHL 1994, p.11).

Figure 8: Determinants of national competitive advantages

Source: PORTER M., *The Competitive Advantage of Nations - With a New Introduction*, 1998, p.127.

Factor conditions are important, given the fact that without any inputs there cannot be much output. However, as opposed to traditional trade theory, PORTER claims that "Factor Creation Mechanisms" are even more important. Raw materials, labour and technical know-how can be acquired from world markets, especially for modern industrial activities, as the economic catch-up process of e.g. the Asian "Tiger States" has shown. Thus, more crucial than classical factor endowments are human capital, i.e. education and training, managerial expertise, and character qualities. In fact, PORTER argues that "... incentives, effort, perseverance, innovation, and especially competition are the source of economic progress in any nation..." (p.736). Therefore, the development and application of knowledge and intellectual skills are the real crucial input factors that matter in modern manufacturing industries. For the leading US food producers, for example, HENDERSON (1998) showed that in 1995/96 expenditures on research and development (R&D) and for advertising were positively correlated with a "competitiveness index" based on a combination of earnings and international market share, and profitability. This finding underlines the importance of human capital even in relatively "low-tech" (TRAILL 1997, p.401) industries such as food processing/manufacturing.

Demand conditions, especially the existence of a strong and sophisticated home demand, are important in particular in industries where economies of scale and learning curve effects exist. A strong home demand promotes innovation and product differentiation, just as rapid growth rates and early market saturation "pull" industry competitiveness. Strong preferences of Germans for different types of local beers, of French people for cheese variety, or of Italians for a larger choice in pasta products may be seen as an example, and today all three countries are important net exporters of these products.

Related and supporting industries may supply important inputs. Geographic concentration in a cluster of supporting industries may lead to economies of scope, as short transport ways and the sharing of R&D or communication facilities can reduce unit production costs at the cluster level. 'Silicon Valley' may be an example for the high-tech industry. For the food industry one might think that a locally strong agricultural sector is crucial, but there is some evidence that raw materials are increasingly sourced internationally (e.g. Italian Parma ham is made partly from Dutch pigs or Parmesan cheese from Bavarian milk.) However, especially for modern food products, the availability of specialised packaging companies and transport logistics may be crucial, especially when delivering perishable goods to far-distant export markets. Moreover, given the importance of advertising (food products are among the most intensively advertised consumer products) the availability of specialised marketing agencies may also be important. Finally, getting access to shelf space is probably the largest problem that at least small and medium-sized food manufacturers face, indicating the importance of supporting retailing companies, especially in the industrialised economies' highly concentrated food retailing markets.

Firm strategy, structure, and rivalry is reflected in the willingness and capability of actively entering foreign markets, which may differ considerably between countries due to culture or inertia of existing economic structures. Furthermore, PORTER (p.117) claims that "... firms in nations with leading world positions often have a number of strong local rivals... . This is true not only in fragmented industries but also in industries with substantial economies of scale". For the food processing industries several econometric studies have consistently shown the statistically significant relationship between the intensity of domestic competition and external market competitiveness, thus supporting the argument that the lower the level of seller concentration in a food producer's home market, the greater the company's success in foreign markets (see HENDERSON 1998, p.122 and the studies cited there). In sum, company strategy and market structure together with the role of supporting and related industries illustrate the importance of *industrial organisation* for gaining success in international markets.

Government and chance, although being equally important, differ from the other four determinants. These two forces effect competitiveness indirectly in so far as they have an influence on the other four factors. The government's role is to amplify the efficiency of the four main determinants with appropriate policies, programs, and other social instruments in order to maintain or to improve in a sustainable way the national competitive advantages. However, these instruments have to be chosen and applied carefully. Especially in the agricultural sector in many parts of the world (e.g. the EU, USA, Japan, etc.), the respective governments have tried with enormous financial efforts to influence the competitiveness of local food production. In particular farmers have received large amounts of subsidies, but as we know today this has produced a more inefficient agricultural sector than a more competitive one (TYERS & ANDERSON 1992). Therefore, government intervention also has the potential to influence national competitiveness negatively (PORTER 1998, p.127). Chance, too can affect the performance of individual companies, industrial sectors and whole national economies in both ways. Apart from natural disasters or wars, regional or worldwide supply or demand shocks (e.g. the "oil crisis"), or political events beyond the home governments control, can have devastating effects on the bottom line of economic activity. On the other hand, for example the accidental discovery of a new recipe or a new food product can result in very positive effects on the competitiveness of individual companies or whole industrial sectors. Take the invention of the champagne method and France's leading world position in this particular market as an example.

Empirical studies based on PORTER's concept for the food processing sector have been conducted e.g. by HARTMANN (1993) for German food manufacturers and DRESCHER & MAURER (1999) for the European dairy industries. Both studies investigate the competitiveness on the industry level using an index measure, the Revealed Comparative Advantage Export Indicator (*XRCA*) and the Revealed Comparative Advantage Net Export Indicator (*NXRCA*), which are both based on (net) export shares of the analysed country industry in total industry exports.³² Although it may be problematic to evaluate the multidimensional concept of competitiveness only by export shares, both studies were able to rank different countries' food or dairy industries and thus reveal relative differences in the countries' competitive positions. For example, HARTMANN (1993, p.245) found that in 1990, using the *NXRCA* index, German aggregate food manufacturing sector took only position 10 within the 13 countries analysed, with Denmark, Ireland and the USA leading the field. Similarly, DRESCHER & MAURER (1999, p.174) found that for the period of 1983-93, by using the same measure, Denmark had comparative competition advantages in dry milk, butter and cheese production, whereas Ireland had even advantages in almost all the analysed dairy products (fresh milk, whey, dry milk, evaporated milk, butter and cheese). On the other hand, Italy turned out to have only a weak competitive position in all of these products, and so had Spain. Germany was found to possess a strong competitive position in evaporated milk only and to be comparatively weak in the whey, butter and cheese industries. However, these positions do not seem to be very stable as they change considerably under different conditions and when different measures are applied. Therefore, the results of both studies must be taken cautiously.

Criticism of PORTER's theory may be related to the whole concept of competitiveness. It is a term under which different people understand different things, i.e. the term is not defined exactly or in a widely accepted way. Especially, PORTER's approach to define competitiveness in relationship to export performance seems not free of problems. There may be industries that are perfectly competitive in terms of profits, market shares and employment levels in their home markets but simply do not engage in foreign business activity. Furthermore, for some industries it may be easier to enter foreign markets than for others. Food products may belong to the latter group, as these goods are often difficult to transport and as they often may be culturally-bound products made for local preferences and consumption habits. Finally, it seems that the whole theory applies best to the Anglo-American kind of doing business, i.e. within large companies that are listed on stock markets and managed by highly trained professionals. We know however, that at least in Europe (see TRAILL & GILPIN 1998 and Section 2.4.1), food manufacturers are typically small or medium-sized. Very often they may be family owned and typically run by the owner "hands on" in the production process and operating mostly in local markets. Therefore, PORTER's strategic

³² The Revealed Comparative Advantage Export Indicator (*XRCA*) is an index measure calculated on the basis of export flows, with values in excess of 1 indicating a comparative advantage in the competitive position of a country's industry, and values below 1 indicating a comparative disadvantage. The *XRCA* puts the export share of an analysed country's industry in world exports in this product category in relation to the share of the country's total exports in world total

exports. Thus, $XRCA_{ij} = \left(X_{ij} / \sum_j X_{ij} \right) / \left(\sum_i X_{ij} / \sum_i \sum_j X_{ij} \right)$, with X being exports, and i and j referring to the individual

industry and country, respectively. The Revealed Comparative Advantage Net Export Indicator (*NXRCA*) expresses the net foreign trade position of a country, i.e. $(X - M)$ with M being imports, corrected by the net foreign trade position of all industries together. $NXRCA_{ij} = [NX_{ij} + (NX_{ij} \cdot NX_{Tj})] \cdot 100$,

with $NX_{ij} = (X_{ij} - M_{ij}) / (X_{ij} + M_{ij})$ and $NX_{Tj} = \sum_j (X_{ij} - M_{ij}) / \sum_j (X_{ij} + M_{ij})$. This index, apart from very special cases,

takes values between -100 and 100 with the more positive the value the better the relative competitive position of the country for the analysed industry (BALASSA 1989, p.81-85).

management theory for globally operating industries may only be partly applicable to the large numbers of locally orientated and small-scale food businesses.

In summary, PORTER 's approach has clearly opened international trade theory in so far as he sees the thoroughly human activity of trade as determined by human performance rather than by sheer factor endowments or technical features of production, such as economies of scales. Moreover, in suggesting that trade performance is a multidimensional concept with all determinants being important, such as factor and demand conditions, company strategy and market structure, supporting industries, and government and chance, it becomes clear that a comparative advantage in production will not necessarily lead to a competitive industry. Also, PORTER's theory is also mainly focused on the production side. However, in the international trade of food products the role of *foreign* demand may be more important.

2.3.2.4 The role of demand and the contribution of international migration & tourism to food product trade

Different approaches to explain trade in a general way exist, as seen before. Standard economic trade theory focuses strongly on the production side of the general equilibrium structure of economies and argues mainly that differences in technology or factor endowments are the causes for trade. On the other hand, PORTER's (1990/98) argument that a national comparative advantage in production does not lead necessarily to competitive advantages for all industries and companies involved, stresses the importance of trade "infrastructure" such as industry and market structure, management know-how, politics, etc. However, even "a free way" to foreign markets may not be a sufficient cause for the development of trade flows. Countries may differ in their production possibilities, industries may be highly competitive and politics may not limit trade deals, and yet there may be no substantial flows of goods unless there is specific demand for home products in foreign countries. In the international trade of food products this aspect may be especially true, given the fact that preferences play a significant role in food choice and that tastes are often influenced by local culture and traditions. That is, it may be very difficult to market a food product to a foreign country, where it is not known and where people may prefer their own local foods.

For example, highly competitive Dutch or Danish pork producers may face problems in selling large amounts of their meat in Islamic countries. Milk may be produced in absolute low-cost conditions but it still may not be able to be marketed to countries with high lactose-deficiency rates in the local population. Foreign beer producers may find it very hard to export beer tins onto the German market where people care for ingredients and production processes as regulated by the German purity law for beer ("Reinheitsgebot") (GORDON 1998, p.93). Vegemite, the classic Australian household spread, may have huge selling success in its own country, and its production and marketing may be highly efficient, but it is still not exportable to overseas markets where people just not grow up with it.

The following section will try to expand existing knowledge in order to understand better how demand conditions determine international trade flows, especially for foreign food products. In particular, the role of migration and tourism as two important channels of learning about new food products and their potential to alter existing preferences will be examined. Not very much "hard" research has been done on this special topic so far, therefore both a theoretical and an empirical analysis for the case of Germany will be provided.

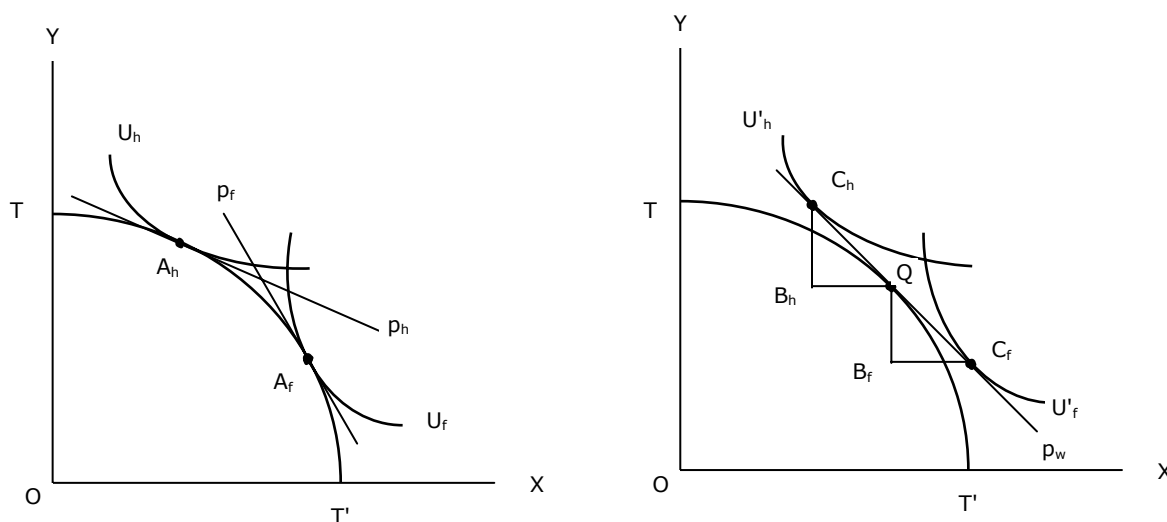
2.3.2.4.1 Theoretical foundations

The Linder Hypothesis by LINDER (1961) has probably been the most convincing argument put forward so far that challenged standard trade theory with its strong focus on the production side of economies. Based on the observation that a large volume of trade in manufactured goods exists between similar countries, Linder highlighted the role of demand for this kind of trade. He concluded that countries with the most similar demand pattern for manufactured goods will tend to be those with similar per capita incomes. In poor countries people may tend to buy relatively simple products, whereas with rising income levels, people may want more sophisticated devices, i.e. the same best products. Thus, trade between industrial countries has increased significantly due to similarities in demand, rather than because of comparative advantages in production resulting from differences in (relative) factor endowments.

More analytically, MARKUSEN *et al.* (1995, pp.196-202) have described two special cases where trade can be explained by differences in tastes even within the traditional Heckscher-Ohlin framework. The first case assumes different tastes in two otherwise identical economies. Preferences for different goods in the two economies result in price differences for identical goods. After opening up to trade, product prices are equalised to the world price level. The second case deals with non-homogenous preferences and can help to explain how budget shares for food and other consumption goods vary widely across countries, given different levels of per capita income. Both cases are reviewed in the following.

Different tastes (see *ibid.*, pp.198-200) imply that the utility functions of two countries H and F are different but both homogenous³³. Otherwise the two countries are assumed to be identical, i.e. they have the same production functions (TT'). Furthermore, it is assumed that endowments are identical and that production takes place with constant return to scale and under perfect competition.

Figure 9: Trade based on differences in tastes within the Heckscher-Ohlin framework



Source: MARKUSEN J., MELVIN J., KAEMPFER W. & MASKUS K., *International trade: theory and evidence*, 1995, pp.198-99.

³³ A function $Y = f(X_1, X_2, \dots, X_n)$ is homogenous of degree r if and only if $t^r Y \equiv t^r f(X_1, X_2, \dots, X_n) \equiv f(tX_1, tX_2, \dots, tX_n)$ (TOUMANOFF & NOURZAD 1994, p.468) for any value of $t > 0$. That is, a homogenous function of degree r is one whose value increases by a positive constant t raised to the power $r \geq 0$ when all independent variables are increased by this constant. For the given case this means that with rising income levels, but constant prices, the two countries will hold constant the ratio of goods consumed, i.e. $r = 1$.

The autarky equilibrium (left-hand model in Figure 9) is given where the highest indifference curve for each country is tangent to the production possibility curve (in A_h and A_f). Assuming that preferences (tastes) in Country H are biased towards good Y relative to tastes in Country F , U_h and U_f then represent community indifference curves for the utility functions of H and F respectively. Given the autarky price lines p_h and p_f , good Y is thus relatively expensive in Country H , whereas commodity X is relatively expensive in Country F . This simply because a stronger preference for good Y in Country H drives up its price as compared to good X . The opposite is true in Country F .

When it comes to trade (right-hand model in Figure 9), residents in both countries will realise that their preferred good is cheaper in the other country and consequently will buy the other country's product. This then will be followed by a shift in production with Country H producing less of good Y and Country F producing more of it. As a consequence, adjustments will continue until the new equilibrium point Q is found. Changes in the production levels are accompanied by adjustments in the relative prices of the two commodities and will continue until the common world price level p_w is reached. Under the assumption that the resulting trade is balanced (i.e. the triangles $C_h B_h Q$ and $Q B_f C_f$ are identical), the new equilibrium involves that each country imports the good towards which its taste is biased. Thus, Country H will end up importing commodity Y and exporting good X , whereas the opposite would be true for Country F . As a result, it can be stated that when differences in tastes are the predominant cause of trade, nations will tend to import the goods which are most preferred in consumption.

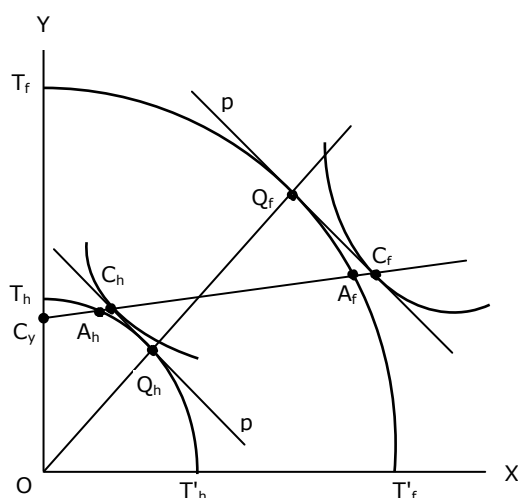
This model stands in contrast to the *Linder Hypothesis*, however, which predicts as mentioned before, the exact opposite, i.e. trade is generated not because tastes are different, but because they have become increasingly similar. In fact, for food markets there is some evidence that international food consumption has converged over time (HERMANN & RÖDER 1995; GIL *et al.* 1995), reflecting increasingly similar tastes, while during the same period trade in food products has increased considerably. Given this contradiction, the presented model does not seem to yield valuable insights for international food product markets. Therefore, another standard case, where tastes are considered to be non-homogeneous but nevertheless identical will be examined next.

The assumption of non-homogeneous but nevertheless identical tastes as a source for international trade seems to be more valuable, especially for food markets, as such a taste structure implies a minimum consumption requirement for one good even at a zero income level. However, non-homogenous tastes (see MARKUSEN *et al.* 1995, pp.46-47) can only be aggregated into community indifference curves, and thus be used for country-level economic analysis, when underlying income-consumption curves are linear and do not go through the origin.³⁴ In using these special assumptions, non-homogenous tastes can actually be treated as "quasi-homogenous" what then allows one to illustrate how differences in per capita income across countries can lead to different national budget shares for food and other goods. International

³⁴ Aggregation of individual consumer's preferences into community indifference curves is only possible in cases where, at constant prices, the overall ratio Y/X of the goods consumed is independent of changes in aggregated income. It can be shown (see MARKUSEN *et al.* 1995, p.46-47) that with a linear income-consumption curve (i.e. the relationship between the overall ratio Y/X of the goods consumed and aggregate consumer income) which does not go through the origin (i.e. one good is even consumed with zero income), a redistribution of income among consumers does not change the overall ratio Y/X . However, as in this special case the ratios Y_a/X_a of the goods consumed by individual consumers do change after the redistribution of income, this type of preference is called "quasi-homogeneous".

trade in such a situation is once again generated due to differences in the autarky prices of the same good in two economies.

Figure 10: Trade based on non-homogeneous tastes within the Heckscher-Ohlin framework



Source: MARKUSEN J., MELVIN J., KAEMPFER W. & MASKUS K., *International trade: theory and evidence*, 1995, p.200.

Two countries H and F (see MARKUSEN *et al.* 1995, pp.200-201) are assumed to have identical populations, but Country F has superior technologies for producing both goods X and Y . This situation is illustrated in Figure 10 in that its production frontier ($T_f T'_f$) is a "radical blow-up" of the production possibility curve ($T_h T'_h$) of Country H , which means that along any ray from the origin, the slopes of the two curves are equal. Furthermore, it is assumed that all consumers in both countries have the same (non-homogeneous) preferences and in particular that there is a minimum consumption requirement of Y in both countries. The origin for a system of indifference curves is then point C_y . Country F has a higher per capita income than Country H as a result of a larger national product due to the higher production frontier at the same population level. The lower per capita income in Country H implies a relatively higher demand for good Y as compared to Country F . The autarky equilibria will be at points A_h and A_f . At these points there will be, because of the similar production structures, a relatively high autarky price of Y (X) in Country H (F).

After opening up to trade the two different autarky prices will equalise to the free trade price ratio p . Due to the assumptions, the production points Q_h and Q_f lie on the same ray from the origin and the consumption points C_h and C_f lie on the same ray originating from C_y . As a result, low per capita income Country H imports Y and the richer Country F imports X . Another important implication is that with quasi-homogenous preferences, the proportion of income spent on Y (the good with the minimum consumption requirement) falls and the proportion spent on X rises as per capita income increases. That is, good Y is income-inelastic (elasticity less than unity) and demand for X is income-elastic (elasticity is greater than unity). Thus, the poorer country tends to import the good with the low income elasticity which suggests that (poor) developing countries in general can be expected to be food importing nations.

Disadvantages of these standard cases are that, although being interesting and providing valuable insights in some special situations, they are not suitable for explaining why trade especially in differentiated consumer food products has risen so strongly during the last decades, especially in industrialised countries. In particular, trade in both models is *inter-industry* in nature, thus they are not appropriate for the analysis of industrialised countries' food product trade. Furthermore, it is not clear how preferences are

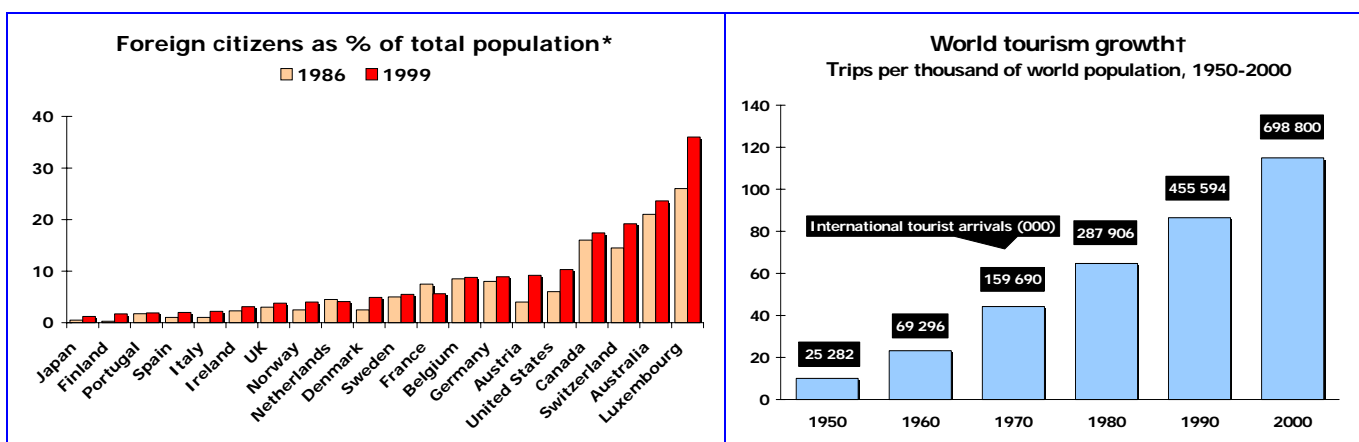
actually formed. Just assuming that tastes are either totally different or totally similar, without giving any condition on what this depends, shows a lack of knowledge of how tastes are actually created.

A different approach is therefore needed which is able to explain how preferences are influenced apart from income and prices, as we know that food in industrialised nations has become widely income and price inelastic. In the following, the relationship between factors that may influence preferences for foreign food products and aggregated demand for these products will be examined. That is, the nature of the correlation between preference building for foreign food products and increased rates of imports of these products will be investigated.

Developing a preference for a product typically means using existing information about the attributes of a product in order to compare these proprieties with an existing value structure. If these attributes are, or at least if they are believed to be, similar with our ideas of how a product should be, we will develop a positive attitude — i.e. a preference — for it (SCHAFFNER *et al.* 1998, p.66f.). Obtaining information about a product is a crucial first step for the development of a taste. For foreign food products information is typically transferred through migration, international travel and media (CARTER 1997, p.9; GORDON 1998, p.93). The influence of media is the most difficult to measure and therefore will not be further investigated in the following.

A first examination of trends in international migration and tourism shows strong growth in both activities during the last decade(s). In almost all OECD countries the immigrant levels have risen significantly during the period from 1986 to 99 (see left-hand side of Figure 11). In Germany, Austria, Belgium, the United States, Canada, Switzerland, Australia, and Luxembourg the percentage of foreign citizens in 1999 reached or surpassed 9% of total population, with Australia and Luxembourg each having more than 20%. Growth in world tourism has even been more impressive (see right-hand side of Figure 11), with almost 700 million worldwide tourist trips in 2000 as compared to about 25 million in 1950. Measured per head of world population, tourism activity has increased more than ten-fold during this period.

Figure 11: Immigrant shares in OECD countries 1986/99, and growth in world tourism activity from 1950 to 2000



Sources: *OECD, *Trends in International Migration*, several editions, Paris.

†World Travel Organisation, *World Travel Statistics*, various issues, Geneva; own calculations.

The influence of migration on international trade flows in general and in particular for the international trade in services has been shown as significant (RUSSELL & TEITELBAUM 1992). More specifically, the connection between international migration and trade can be twofold: (1) labour migration generates host-country demand for source country products, and (2) the specialised knowledge (business connections, language and cultural skills) of immigrants can contribute to lower transaction costs for the trade between the host and the source countries of the migrants and thus facilitate trade development between these economies (ETHIER 1996, p.50).³⁵

The role of immigrant links in facilitating trade between the United States and the home countries of its immigrant population was investigated by GOULD (1994) empirically. In using a panel data set of 47 U.S. trading partners for 1970 through 1986, the results reveal that (*ibid.*, p.303)

Immigrant links to the home country have a strong positive impact on exports and imports, with the greatest effects on consumer manufactured exports. These effects tend to increase at a decreasing rate as the size of the immigrant community grows, and they also depend crucially on the type of goods traded.

For Australia, AISLABIE *et al.* (1994) explored the relationship between the growth in the country's multicultural population and the direction, volume and composition of its trade in goods and services. The study found that, at the aggregate level, there is no association between recent growth in major immigrant population sources and the growth and direction of Australian exports, but there is significant rank correlation for the sub-period 1986-87 to 1990-91. AISLABIE *et al.* conclude, although acknowledging the use of inadequate data, that the argument that immigration stimulates exports with the immigrant source countries may be true in specific cases, but not in general. More specific for the Australian food industry, the contribution of East Asian immigrants on export success within East Asia has been tested by ROD & WEBSTER (1995). The results of their intensive survey study of over 1700 Australian food manufacturers and wholesalers show that language skills and cultural knowledge of the immigrant employees are considered as "useful but not necessary" for successful exporting to East Asian countries (*ibid.*, p.xiv).

The more direct connection between immigration and trade in that immigrants may prefer consuming their source country products in their host country and thus stimulate imports of certain goods has been much less researched so far. Empirical results confirming this argument are scarce, although statements that illustrate the connection can be found frequently in the literature. For example, PINARD (1995, p.122) states that "Parmesan (cheese) which accompanied the Italian immigration to several industrial regions also spread to the South of France". For the case of Australia it was argued (see RIRDC 1994, pp.2-3):

All migrants bring with them their habits, customs and tastes, each of these have strong persistence. So it was with the Chinese diggers, who in this respect were no different than the British convicts and their gaolers. ... After 1850 the Chinese inhabitants of New South Wales and Queensland began to import processed food that was distinctively Asian. ... From very early times, the Chinese also imported their own alcoholic drinks, fiery liquors made from rice, sorghum and other grains.

³⁵ This topic is in fact part of a much broader and general discussion among international economists on the substitutability or complementarity of international trade in commodities and international movements of labour. The discussion however is mainly concerned with supply side effects, i.e. to what extent labour offered by immigrants in the host country replaces or promotes trade flows in general and in particular from the source countries. This topic will not be discussed further in the following, however for a recent and applied overview see LLOYD & WILLIAMS (eds., 1996).

The reason for the lack of hard empirical evidence may be that the relationship between immigrants preferences and imports from their home country cannot be expected to be a general one. On the contrary, the proposed connection may probably only be relevant for certain goods and selected ethnic groups.

The following assumptions have to be made, therefore: (1) Consumer goods and in particular culturally-bound goods such as certain food products may be expected to much more likely follow migrant flows, as e.g. raw commodities such as steel, wheat or beef, or as intermediate goods such as machinery, tools or electronic products. (2) Goods may only be expected to follow migrant flows if these people value the goods highly enough to compensate for the efforts that are needed to establish trade connections. That is, there must not be close substitutes for source country goods available in the host country. (3) An ethnic group must be prone to engage in trading, i.e. the activity of trade in general must not be seen as dishonourable within the ethnic group. Some nationalities seem to engage more in small-scale trade businesses than other, for example, Arabic, Chinese or Italian may be more active in this kind of business than Anglo-Saxons, French or Germans. (4) The imported source country goods must be allowed to be imported into the host country, i.e. they must follow local safety rules and morality standards. Especially for food products, this condition may not always be fulfilled and trade may be blocked despite sufficient potential demand. Take raw milk cheese as an example, a product which is not allowed to be imported into countries such as the US or Australia. But even given these assumptions the actual "mechanics" which underlies the relationship between rising immigrant levels and increased imports of certain products is not yet clear. Therefore an economic model is needed which allows for more precise analysis.

Demand (q) for a food product can generally be seen as a function of income (I), own price (p), prices of close substitutes (p^k_s , with $k=1$ to n), and preferences (z) (YOUNG & BURTON 1997). That is,

$$q = f(I; p; p^k_s; z). \quad [2.3.2.4-1]$$

In traditional consumer theory and demand analysis, preferences are usually not directly included in theoretical and empirical investigations due to difficulties in the identification and specification of appropriate indicator variable(s) (VON ALVENSLEBEN 1997, p.209). However, for the analysis of aggregate foreign food product demand, immigration and tourism may be regarded as suitable indicators for prevailing preferences. This will be made clear shortly.

Total demand for food products in a country can be disaggregated into demand for food products of the home population (q^{HOME}) and demand for food products of the immigrant population (q^{IMM}). Furthermore, demand of both population groups can be divided into demand for home produced food products (q_{prod}) and imported food products (q_{imp}). That is, total demand for food products (q_{total}) is equal to

$$q_{total} = q_{prod}^{HOME} + q_{imp}^{HOME} + q_{prod}^{IMM} + q_{imp}^{IMM}. \quad [2.3.2.4-2]$$

In the following, however, we are mostly interested in the imports of foreign food products, thus the equation [2.3.2.4-2] can be reduced to

$$q_{imp} = q_{imp}^{HOME}(I^{HOME}; p_{prod}; p_{imp}; z^{HOME}) + q_{imp}^{IMM}(I^{IMM}; p_{prod}; p_{imp}; z^{IMM}) \quad [2.3.2.4-3]$$

which states that demand for imported food products depends on the income of the home and the immigrant population, the price indices for locally produced food and imported food products (seen here as close substitutes) and the (presumably different) tastes of the local and the immigrant population.

The influence of income and prices on demand for food products in industrialised societies, however, may have diminished over the last decades, or as VON ALVENSLEBEN (1997, p.209) put it:

With rising consumer income, the relative influence of prices and income on food demand is decreasing while the influence of preferences is increasing. For example, in their study of the causes of changing patterns of food product consumption in the UK, RITSON & HUTCHINS (1991) show that, during the 1960s and 1970s, most of the changes in patterns of food product consumption were caused by changes in prices and incomes but, since 1980, changes in tastes and preferences have dominated. Similar developments have been observed in other industrialised countries (VON ALVENSLEBEN 1989). In affluent societies, future changes in food demand will be more and more caused by preference changes rather than by price and income changes.

Therefore it may be justified to abstract from possible differences in incomes between the home and the immigrant population and price differences between local and foreign manufactured food products. It is then relatively straightforward to show that $q_{imp} = f(IMM)$, with $f' = \partial q_{imp} / \partial IMM > 0$, i.e. that imports for foreign food products are an increasing function of the share of immigrants (IMM) in an economy.

The overall share s of foreign food products in total food consumption can be defined as

$s = \frac{q_{imp}}{q_{total}}$. Let's assume that home people have a lower share $s^{HOME} = \frac{q_{imp}^{HOME}}{q_{total}^{HOME}}$ of foreign food products

consumed than the foreign population $s^{IMM} = \frac{q_{imp}^{IMM}}{q_{total}^{IMM}}$, that is $s^{HOME} < s^{IMM}$. Now s can be calculated as

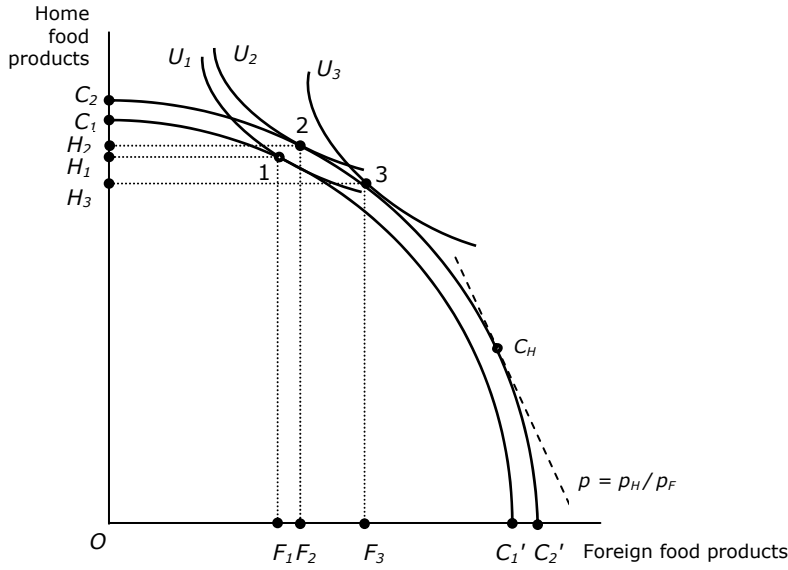
$s = s^{HOME} \cdot HOME + s^{IMM} \cdot IMM$, or as the share of home population ($HOME$) in total population equals $(1-IMM)$:

$$s = s^{HOME} + (s^{IMM} - s^{HOME}) \cdot IMM. \quad [2.3.2.4-4]$$

Given $s^{IMM} > s^{HOME}$ and assuming both shares are (positive) constants, it becomes clear that s rises with higher immigrant shares in the home economy and so does q_{imp} . However, it may also be possible that the shares s^{IMM} and s^{HOME} are not constant, but depend themselves on other factors.

A positive relationship between the consumption habits of the home population and the level of immigration, such as $s^{HOME} = f(IMM)$, with $f' = \partial s^{HOME} / \partial IMM > 0$, may be possible. It can be assumed that when an immigrant group brings with it its ethnic restaurants, retail outlets, stalls on local produce markets, etc., it will not only supply to its own ethnic group but the home population may also start to consume some of the new foods offered (KÖHLER 1994, p.335). Therefore, the consumption habits of the home population may alter in the long run, provided that the "new" foods offer some advantages (in terms of taste, health value perception, price, etc.) over the traditional, locally produced food products. That is, this effect will enforce the positive relationship $q_{imp} = f(IMM)$, with $f' = \partial q_{imp} / \partial IMM > 0$ between immigrant levels and food product imports.³⁶ On the other hand, it may also be possible that s^{IMM} changes over time (t), as it can be assumed that the immigrant population adopts at least some of the local consumption habits, i.e. $s^{IMM} = f(t)$, with $f' = \partial s^{IMM} / \partial t < 0$.

³⁶ In fact, it may be quite possible, that also on the demand side the stimulating influence of immigration on trade flows diminishes with rising immigration levels, i.e. $f'' = \partial^2 q_{imp} / \partial IMM^2 < 0$, similar to the immigrant effect on export promotion as suggested by GOULD (*op. cit.*). This, because it seems likely that the change in the consumption habits of the home population will only be partial, and once the interested home population has sufficient access to the newly imported products, more immigrants will not bring further changes. However, more immigrants always result in increased aggregated food demand and given the assumption that they have a preference for their home country products,

Figure 12: The two effects of immigration on food product imports

Source: Author's draft.

Figure 12 provides an approach to illustrate the effects of rising immigrant levels on food product imports from the source country. Although resembling a Heckscher-Ohlin model, the above figure is considerably different. C_1C_1' is not a production frontier but describes the consumption choice that a country may face. Country H can choose between either producing all food products by itself (in which case it would be in the autarky position at C_1), to import all foods (in which case it would be at C_1'), or it can choose any position in between these extremes. Every point C_H on the "consumption frontier" can be associated with a different price ratio p of the price for food products produced at home p_H and the price for imported foods p_F .³⁷ For further analysis, however, it will be abstracted from price effects, because, as already mentioned before, food products in today's affluent industrialised societies are likely to be price inelastic. In a typical (industrialised) economy immigrant groups are in a minority situation (although their sizes are rising) and preferences of the home population (although changing) may be biased against locally manufactured food products. Thus, an initial equilibrium could be at Point 1 which is determined by the "consumption possibility curve" C_1C_1' and the community indifference curve U_1 . Point 1 determines also the initial overall share of imported food products in total food consumption, as given by the ratio

$$s_1 = \frac{\overline{OF_1}}{\overline{OH_1} + \overline{OF_1}}.$$

imports will rise proportionally to immigrant numbers, i.e. $f'' = \partial^2 q_{imp} / \partial IMM^2 = 0$. Thus, it will depend on the size of the two individual effects whether their combined (added) effect is actually decreasing or constant.

³⁷ The shape of the "consumption frontier" suggests that prices for home food products as compared to imported food products become increasingly expensive as a country moves versus an autarky position (i.e. high rates of self-sufficiency). By the same token, total reliance on imports is assumed to result in high relative prices for imported foods, as there may always be at least some food products that a country could produce more cheaply at home.

With an increase of the immigrant population in Country H , total population in general grows too and the share of the immigrant group rises. A growing total population implies that more food is needed in the country which leads to a "radical blow-up" of C_1C_1' , resulting in C_2C_2' . As the population growth is mainly generated by the immigrant population, aggregated preferences may change as well which would result in the new equilibrium point 2. As shown in the figure, the increased total demand for food is mainly supplied through imports and only by little through locally produced products. Of course, this ratio depends on the preferences of the newly arrived population. In total, the new share s_2 of imported food products in all consumed food products is given by $s_2 = \frac{\overline{OF_2}}{\overline{OH_2} + \overline{OF_2}}$ which is larger than s_1 .³⁸

The second effect of rising immigrant levels may be the change in consumption habits of the home population. As argued above, immigrant food products may be perceived by the home population (or at least a part of it) as beneficial since these products may offer, apart from more variety in the daily diet, a more tasty, healthy or cheaper alternative to locally produced foods. Given the assumptions outlined before, the preferences in Country H may then change in favour for the foreign food products, which is illustrated in Figure 12 by the new community indifference curve U_3 and the shift from Point 2 to Point 3. This new equilibrium is characterised by a much higher share s_3 (as compared to s_1) of imported food imports in overall consumed food products due to the substitution of locally manufactured food by imported products in the home population.

Rising international tourism activity may have a similar potential to alter existing preferences in the home population. Tourists (TOU) who learn about exotic foods during their travel may develop a taste for these products and later on — back in their home countries — may continue to consume the "new" foods in ethnic restaurants or buy them in supermarkets or speciality shops (KÖHLER 1994, p.335). That is, imports of foreign food products may also be a rising function of tourism, or $q_{imp} = f(TOU)$, with $f' = \partial q_{imp} / \partial TOU > 0$. Of course, this may only be true for a part of the tourists and only for some countries and food products, however the effect might be strong enough in order to be measured at the aggregate market level. The "mechanics" is in fact similar to the second effect of immigration in Figure 12. With rising international tourism to certain countries, the community indifference curve may be altered in favour of foreign food products, which results in a rise of imports of these goods.

³⁸ To show this more formally, assume $\overline{OF_2} = a \cdot \overline{OF_1}$ and $\overline{OH_2} = b \cdot \overline{OH_1}$, with $a > b$. Now $s_2 = \frac{a \cdot \overline{OF_1}}{b \cdot \overline{OH_1} + a \cdot \overline{OF_1}}$ or

$$\frac{1}{s_2} = \frac{b \cdot \overline{OH_1} + a \cdot \overline{OF_1}}{a \cdot \overline{OF_1}} = \frac{b}{a} \cdot \frac{\overline{OH_1}}{\overline{OF_1}} + 1. \text{ Reparameterisation then yields } \frac{1}{s_2} = c \cdot \frac{\overline{OH_1}}{\overline{OF_1}} + 1, \text{ with } c < 1 \text{ as } a > b.$$

$$\text{Similarly, } \frac{1}{s_1} = \frac{\overline{OH_1} + \overline{OF_1}}{\overline{OF_1}} = \frac{\overline{OH_1}}{\overline{OF_1}} + 1. \text{ From this it can easily be seen that } \frac{1}{s_1} \text{ is larger than } \frac{1}{s_2}, \text{ or } s_2 > s_1.$$

Recent empirical research has found conflicting evidence for the influence of tourism on international trade flows. EASTON (1998) investigated the general relationship between the levels of tourists travelling to Canada and aggregated exports to the source countries of the tourists. The study is primarily interested in the question whether trade and tourism are substitutes or complements, i.e. whether rising costs of Canadian exports affect tourism to Canada positively or negatively. In using a pooled time series and cross-section sample of 18 countries during a period of 21 years (1972-92) the study finds some (weak) evidence that a rise in the costs of Canadian goods promotes travel to Canada. Although acknowledging the use of inappropriate data (aggregated total exports rather than exports of consumer goods only) (p.529), EASTON thus sees his hypothesis confirmed that "... by purchasing and drinking French wine in your own country, that consumption acts as substitute for visiting France" (p.523). However, it is also acknowledged that *a priori* theoretical considerations allow for both, substitutability and complementarity of tourism and trade. In contrast, REED (1994) uses the number of US tourists travelling to foreign countries as a proxy for cultural similarity of a country to the USA. He argues that "American tourists naturally flock to countries that are similar to the United States" (p.91). The study attempts to determine the influence of economic (income and prices) and non-economic factors (cultural, political and legal forces) on US agricultural exports by processing stage. In using a country cross-section data set from 1987-89 the author finds that the tourism variable (i.e. cultural similarity) was positive and significant for highly processed food products but not for agricultural raw commodities and intermediate products. The results suggest that highly processed food product exports are positively linked to tourism flows, i.e. there is complementarity between them. Therefore, given the theoretical considerations and the empirical results, it is assumed in the following that for the special case of international food product trade, rising levels of tourists to foreign countries in fact do stimulate imports of these products.

In summary, the following theoretical hypotheses are postulated:

- 1) Immigrant levels are positively connected to imports of food products from the source countries of the immigrants, i.e. $q_{imp} = f(Imm)$, with $f' = \partial q_{imp} / \partial Imm > 0$. However, this relationship is likely to be true only for some countries and certain food products. Immigrants must have a strong preference for their source country food products and no close substitutes of their favourite products must exist in the host countries. Furthermore, the establishment of trade relationships between the immigrant source and host country in form of import/export business must be feasible (i.e. political or other restrictions on trade must not be prohibitive), and an ethnic group should be prone to engage in international trade activities.
- 2) Tourism activity to foreign countries is positively connected to the imports of food products from these countries, i.e. $q_{imp} = f(TOU)$, with $f' = \partial q_{imp} / \partial TOU > 0$. Again, this relationship is likely to be true only for some countries and certain food products. The tourist host country must offer food products that are perceived by the tourists as so advantageous (in terms of taste, potential health benefits, or price, etc.), as compared to their home country's products, that (some of) the travellers will continue to consume (some of) these products when they are back in their home countries.

These hypotheses need to be verified by empirical research. Furthermore, only statistical analysis might be able to show for which countries and food products the proposed relationship proves to be true. In the following, econometric regression results are presented and discussed for the case of Germany.

2.3.2.4.2 Empirical evidence for the case of Germany

This sub-section will begin with some econometric considerations which are necessary for the understanding of the nature of statistical error-correction models. Then the origin and the quality of the employed data will be discussed. Finally, regression results for the effects of immigration into Germany and international travel of Germans on German food product imports for the period 1967-90 will be presented and the findings will be discussed.

A) *Econometric considerations*

Measuring the effects of international migration and tourism at the aggregate level may in effect be difficult. In theory, there are three approaches: (1) the use of country or product *cross-section data* at a fixed point of time, (2) the use of *time series data*, and (3) the use of a *pooled* cross-section and time series *data set*. As argued before, the promoting effects of migrants and tourists on international food product trade may only be existent for certain countries and products and *a priori* it is not clear which they are. Therefore, the use of cross-section data seems problematic, as the effects of international migration and tourism may not be constant among countries or products. The same is true for a pooled data set, and unless a statistical model is used that allows for differences in the effects on constants and parameters of individual countries or products, the pooling procedure may not result in more efficient estimates than *separate equation regressions* (DIELMAN 1989).³⁹ For this reason, and because a first examination of existing data with more simple statistical techniques may also yield valuable insights, separate time series regressions will be used in the following.

Time series econometrics has its shortcomings, too. One of the most disturbing is that of *spurious correlation*. This problem arises when time series used in regression analysis exhibit strong trends, i.e. sustained upward or downward movements (GUJARATI 1995, p.709). The obtained goodness-of-fit measure (R^2), i.e. the percentage of the variance explained by the model, is in the presence of spurious correlation very high, however not because of the true statistical relationship between the explanatory variables and the dependent variable, but due to the underlying shared trends. Originally, 'classical' statistical interference was specially designed for variables that are stationary in the sense that their mean, variance and covariances remain constant over time. Clearly, if a variable is trending, then its mean, and very possible its variance, will change over time (THOMAS 1993, p.151). Now, if variables are non-stationary, the OLS (ordinary least square) estimators have sampling distributions with properties very different from those needed for valid statistical interference, and regression coefficients tend to appear spuriously significant. A popular past method of attempting to overcome the problem of spurious correlation has been to estimate relationships between the rates of change of variables, i.e. $\Delta y_t = y_t - y_{t-1}$ and $\Delta x_{it} = x_{it} - x_{it-1}$, rather than between their absolute levels (*ibid.*, p.152). The effect of looking at the rate of change in a variable is typically to remove any trend element. That is, many non-stationary economic time series become stationary when they are first-differenced. Unfortunately, when attention is put on relationships

³⁹ In general, a pooled estimation technique is useful only if some *contemporaneous correlation* can be expected, i.e. disturbances that are measured at the same point of time are correlated between different cross-sections, (DIELMAN 1989, p.29). For the purpose of this study some contemporaneous correlation could be existent e.g. between different products imported from the same country. If there are shared factors that are not captured by the included explanatory variables (such as e.g. "cultural preposition" to engage in activities to make home products available in the host country), then pooled data regressions may indeed result in more efficient estimations than separate equation regressions.

between rates of change, there is a real danger that valuable information in the long-run relationship between the levels of the variables will be lost. First differencing then is an unsatisfactory method of dealing with a spurious correlation problem. A major advantage of error-correction models is that they result in equations with first-differenced and thus stationary dependent variables but do not fail to make use of any long-run information in the data (*ibid.*).

Error-correction models (ECMs) allow for a separate measurement of short-run and long-run effects of the explanatory time series variables x_{it} on the dependent time series variable y_t . A typical ECM usually takes the following form (for the way this specification is derived algebraically see Appendix I):

$$\Delta y_t = \sum_{i=1}^m \beta_i \Delta x_{it} - (1 - \alpha) \left[y_{t-1} - \gamma_0 - \sum_{i=1}^m \gamma_i x_{it-1} \right] + u_t \quad [2.3.2.4.2-1]$$

with $\Delta y_t = y_t - y_{t-1}$ and $\Delta x_{it} = x_{it} - x_{it-1}$ for m explanatory variables and where $\gamma_0 = \beta_0 / (1 - \alpha)$ with β_0 being the usual regression constant (THOMAS 1993, p.153). Equation [2.3.2.4.2-1] can be regarded as stating that changes in y depend on changes in x_{it} and on the term in square brackets which is the disequilibrium error from the previous period.⁴⁰ This makes sense since it implies that the lower (higher) is y compared with its equilibrium value relative to x_{it} , the greater (smaller) will be the immediate rise in y . The value of y is being corrected for the previous disequilibrium error. Hence the term error-correction model (*ibid.*). α and thus $(1 - \alpha)$ determine the extent to which the disequilibrium in period $t-1$ is 'made up for' in period t . Since $0 < \alpha < 1$, only part of this disequilibrium is made up for in period t , causing a different Δy_t than would otherwise occur (*ibid.*).

Advantages of ECM formulation (see THOMAS 1993, pp.154-157) are: (1) If model [2.3.2.4.2-1] is specified in logarithmic form, then $\Delta y_t = y_t - y_{t-1} = \log Y_t - \log Y_{t-1} = \log \frac{Y_t}{Y_{t-1}} \approx \frac{Y_t - Y_{t-1}}{Y_{t-1}}$. This approximation will hold provided growth rates are small so that $Y_t \approx Y_{t-1}$. Hence Δy_t is the proportionate change in Y and, similarly Δx_{it} is the proportionate change in X_i . That is, the parameters can be interpreted as *elasticities*. (2) As argued before, standard regression techniques are invalid when applied to non-stationary variables. Since many economic variables exhibit long-run trend movements, and only become stationary after first-differencing, this suggests that regression techniques are applied not to the absolute levels of variables but to their first differences. The ECM clearly involves the first-differenced variables Δy_t and Δx_{it} , and moreover, provided the model has been correctly specified, the disequilibrium error in square brackets will also be stationary. Therefore, an ECM may be estimated by standard classical regression techniques, provided the sample is large. Thus, since the dependent variable is Δy_t and not the typically trending y_t , it can safely be referred to measures as R^2 without being concerned about the spurious correlation problem. (3) Since the disequilibrium error term involves x_{it-1} and y_{t-1} , an ECM formulation makes use of any long-run information about the levels of variables that is contained in the data. Furthermore, the specification clearly distinguishes between long-run and short-run effects. The parameters γ_0 and γ_i ($i = 1, \dots, m$), which appear in the disequilibrium error term, are the long-run parameters. The coefficients of Δx_{it} , the β_i s, however, are

⁴⁰ Given is the underlying long-run relationship $y_t = \gamma_0 + \gamma_1 x_{1t} + \gamma_2 x_{2t} + \dots + \gamma_m x_{mt}$. If y and the x_i were at all times in equilibrium then clearly $y_t - \gamma_0 - \sum_{i=1}^m \gamma_i x_{it} = 0$. However, there are many times when y will not be at its equilibrium value relative to the x_i and at such times the equation will be non-zero and will measure the 'extent of disequilibrium' between the x_i and y (THOMAS 1993, p.153).

short-run parameters measuring the immediate impact effect on y of a change in x . Similarly, α is a short-run parameter. Most economic theories involve hypotheses or predictions about the long-run relationship between values, but have little to say about the short-run dynamics. This clear separation of short-run and long-run effects, thus make ECMs a very powerful analysis tool. (4) With typical time-series data and a traditional (non-ECM) specification, the variables are likely to be highly correlated, regardless of whether y_t or x_{it} are stationary or not. In estimating such a model the usual consequence of multicollinearity — large standard errors — will be faced. However, the variables in an ECM representation will normally be far less highly correlated. In fact, they tend to be almost orthogonal, that is correlations between them are often close to zero. (5) It can be shown (see Appendix I) that in a typical ECM formulation there is no reason to expect that the disturbance term u_t is auto-correlated.

Stationarity of the variables is one of the requirements for meaningful statistical interference. Intuitively, a time series is said to be stationary if its *behaviour* does not change over time which implies not only the behaviour of individual points, but the collective behaviour of sets of points as well (MASTERS 1995, p.253). Another way of expressing this is that the time path of a series must show *stability* (THOMAS 1993, p.158). More formally, a stochastic process is said to be stationary if, (1) $E(Y_t) = \text{constant}$ for all t , (2) $\text{var}(Y_t) = \text{constant}$ for all t , and (3) $\text{covar}(Y_t, Y_{t+s}) = \text{constant}$ for all $t \neq s$, that is the mean, variance and (auto)covariances of a time series remain constant over time.⁴¹ There are different types of stationarity and strictly speaking, this is a definition for what is known as *weak* stationarity (GUJARATI 1995, p.713), but these differences are beyond the scope of this study. Furthermore, a stationary time series as just defined is not necessarily a "non-trending" time series. An underlying trend just implies that the mean of the series is non-constant, but a trend does not usually affect conditions (2) and (3) (THOMAS 1993, p.158). Many time series encountered in daily life are non-stationary but *homogenous*, i.e. apart from occasional changes in level (or perhaps slope and level), these series exhibit generally uniform behaviour over time (MASTERS 1995, p.253).⁴² However, no answer to the question has found so far why some economic time series are stationary and others are non-stationary (GUJARATI 1995, p.730).

⁴¹ The (auto)covariance at lag s measures the correlation between the original series and itself lagged by s periods (see GUJARATI 1995, p.713). Thus, the condition of a constant (auto)covariance implies that the correlation between any two values of Y taken from different time periods depend only on the "difference apart in time" between the two values (THOMAS 1993, p.158).

⁴² A classic example of homogenous non-stationary time series are stock prices (MASTERS 1995, p.253). A share price may fluctuate around e.g. 40 for some months, then drop to e.g. 30 where it remains for a few more months. Its day-to-day behaviour in the latter period is nearly identical to its behaviour in the former time period. Only its central tendency is different. This behaviour is also known as a "*random walk*", i.e. today's stock prices are equal to yesterday's stock price plus a random shock (GUJARATI 1995, p.718). Differencing then, can make a homogenous non-stationary series stationary.

Testing for stationarity of a time series can be done by using statistical tests such as the Unit Root Test for Stationarity, the Dickey-Fuller Test (DF), the Augmented Dickey-Fuller Test (ADF), and the F -test for a Stochastic Trend. For a *unit root* can be tested in running a regression such as $Y_t = \rho Y_{t-1} + u_t$ and checking $H_0: \rho = 1$ against $\rho < 1$. If it is found that ρ is statistically not different from 1 it can be concluded that the series is non-stationary (GUJARATI 1995, p.718). The Dickey-Fuller Test is similar, but here a regression such as $\Delta Y_t = \phi Y_{t-1} + u_t$ is run, where $\phi = \rho - 1$ and the null hypothesis $\phi = 0$ is tested against $\phi < 0$. Now, a statistically significant value of zero for ϕ implies non-stationarity (THOMAS 1993, p.159). Unfortunately, there is one problem. In case $\phi = 1$ or $\rho = 0$, i.e. the process is non-stationary, then standard distribution theory does not apply and the OLS estimator of ϕ or ρ can be shown to be biased downwards, however large the sample (*ibid.*). Therefore the usual t -test cannot be applied. FULLER (1976), however, has tabulated adjusted critical values for the t -statistic (so called τ [tau] values), which are considerably larger than standard critical t -values (see Appendix I). In using these values it is possible to test the null hypothesis of non-stationarity despite the bias in the OLS estimator. The Augmented Dickey-Fuller Test (ADF) includes also lagged values of ΔY_t in the above Dickey-Fuller regression, i.e.

$$\Delta Y_t = \phi Y_{t-1} + \sum_{i=1}^l \phi_i \Delta Y_{t-i} + \varepsilon_t \text{ where } \Delta Y_{t-1} = (Y_{t-1} - Y_{t-2}), \Delta Y_{t-2} = (Y_{t-2} - Y_{t-3}), \text{ etc.}$$

This test is advised if the error term u_t turns out to be autocorrelated. The number of lagged difference terms l to include is often determined empirically with the idea being to add enough terms so that the error term ε_t is serially independent (GUJARATI 1995, p.720). A more advanced test for stationarity includes also the testing for the type of trend that possibly underlies a chosen time series.⁴³ Here, a regression such as

$$\Delta Y_t = \alpha + \beta T + \phi Y_{t-1} + \varepsilon_t$$

is estimated, or in case the error term shows to be autocorrelated, a regression such as $\Delta Y_t = \alpha + \beta T + \phi Y_{t-1} + \sum_{i=1}^l \phi_i \Delta Y_{t-i} + \varepsilon_t$, where T is a time variable. The null hypothesis is still

$H_0: \phi = 0$ against $\phi < 0$, however under these circumstances (i.e. due to the inclusion of a constant and a time trend) critical t -statistic values are even larger in absolute terms and now have to be compared to what is known in the literature as critical τ_t values (THOMAS 1993, p.162). In order to check specifically for the type of trend that a time series is subject to there is also the possibility to test the joint null hypothesis $\beta = \phi = 0$ in these two models, using the F -test. Failure to reject this joint hypothesis (the empirical F -value is smaller than the tabulated critical one) implies that stationarity can be achieved by first-differencing (*ibid.*). However, the critical F -values cannot be taken from standard F -tables. DICKEY & FULLER (1981) have shown that the F statistic in this case must be compared with special critical F -values which are considerably larger than the standard critical F -values. These values and a more formal treatment of these tests are provided in Appendix I. In summary, however, it has been found that all these tests for stationarity lack power and should not be regarded as precise (THOMAS 1993, p.163). This is especially true for the ADF test as the number l of lagged terms included can seriously affect the values of the test statistics. Therefore these tests need to be applied with care (*ibid.*).

⁴³ In theory there are two different types of trends (see THOMAS 1993, p.162): (1) A *stochastic* trend which takes the form $\Delta Y_t = \alpha + u_t$ where α is a constant and u_t the disturbance term. This type of trend can be removed by first differencing and the Dickey-Fuller procedure tests for such a trend. (2) A *deterministic* trend, which takes the form $Y_t = \alpha + \beta T + \rho Y_{t-1} + u_t$ where T is a time or trend variable. Here Y depends also on T and such a trend cannot simply be removed by differencing. A deterministic trend has to be removed by regressing Y on time and the obtained residuals will then not display any deterministic trend. The practical significance is that a time series with a deterministic trend (a so-called *trend-stationary process* [TSP]) has a more stable time path and thus can be much more reliably forecasted. On the other hand, a time series with an underlying stochastic trend (a *difference-stationary process* [DSP]) is much more unstable and disturbances or shocks to such a time series will not only result in fluctuations of the transitory or cyclical component but will directly affect its levels (GUJARATI 1995, p.724).

Co-integration of several time series may be described intuitively as the existence of a long-run equilibrium relationship between them. That is, they move *synchronously*. In fact, exhibiting trends does not exclude series from being co-integrated. The point is they must be "trending together" (GUJARATI 1995, p.725). In the context of an error-correction model, as pointed out by ENGLE & GRANGER (1987), this means that the disequilibrium errors $y_t - \gamma_0 - \sum_{i=1}^m \gamma_i x_{it}$ observed over time (which measure the extent of 'departure' from equilibrium) should tend to fluctuate around zero, should rarely drift very far from zero, and should fairly frequently 'cross the zero line'. Defining such behaviour more precisely provides the statistical concept of co-integration, which can be found in THOMAS (1993, p.164):

A process or series is said to be *integrated* of order d , denoted as $I(d)$, if it has to be differenced d times before it becomes stationary.

Two or more series are said to be *co-integrated* of order d, b , denoted $CI(d, b)$, if (1) they are integrated of order d , and (2) there exists some linear combination of them that is integrated of order $b < d$.

The most common case for economic time series is a situation such as $CI(1,0)$ which means that a series is non-stationary but by first-differencing can be transformed into a stationary process, i.e. it is $I(1)$. For example, assume a long-run relationship

$$y_t = \gamma_0 + \sum_{i=1}^m \gamma_i x_{it} \quad [2.3.2.4.2-2]$$

and disequilibrium errors such as $\varepsilon_t = y_t - \gamma_0 - \sum_{i=1}^m \gamma_i x_{it}$, i.e. a linear combination of the chosen series.

As just mentioned, in an equilibrium relationship the disequilibrium errors should fluctuate about zero which is another way of saying that they are stationary or $I(0)$. If they were non-stationary and e.g. trending upwards, then y_t and the x_{it} would be moving further and further away from each other, a behaviour that is hardly consistent with a long-run relationship (THOMAS 1993, p.164). But if the ε_t are stationary, i.e. $I(0)$, then, as in fact the error terms result from a linear combination of $I(1)$ time series, and the other condition for co-integration is met, the underlying statistical processes are indeed co-integrated. That is, a stable long-run relationship exists between them.

Testing for co-integration therefore implies, after having checked if y_t and the x_{it} are integrated of the same order, to test the residuals of the *co-integrating regression* (i.e. equation 2.3.2.4.2-2) for stationarity. More specifically, the residuals e_t of this regression are retained which can be seen as estimates of the disequilibrium errors ε_t , and the Dickey-Fuller tests just described are applied to them. However, since the errors ε_t are expected to have a zero mean but they are not expected to have a deterministic trend (see Footnote 43), no intercept and trend variable is included into the Dickey-Fuller regression. Therefore, $\Delta e_t = \phi e_{t-1} + u_t$ is estimated by OLS, or $\Delta e_t = \phi e_{t-1} + \sum_{i=1}^l \phi_i \Delta e_{t-i} + v_t$ in case the error term u_t turns out to be autocorrelated, and the null hypothesis $\phi = 0$ against $\phi < 0$ is tested (*ibid.*, p.165). However, as now the critical values for the Co-integration (Augmented) Dickey-Fuller Test depend on the number m of explanatory variables included in the co-integrating regression, the estimated t -value for ϕ has to be compared to a yet again another critical test statistics (as provided in Appendix I). If $\phi = 0$ is rejected, then the e_t s can be considered as stationary. There are several other tests for co-integration. Another common approach to test the e_t s for stationarity is the Co-integrating Regression Durbin-Watson Test (CRDW) (see GUJARATI 1995, pp.727-728). Here, a regression such as $e_t = \phi e_{t-1} + v_t$ is run and

$H_0: \phi = 1$ is tested against $\phi < 1$. It can be shown that when $\phi = 1$, the Durbin-Watson DW coefficient is likely to take a value very close to zero, but if $\phi < 1$ a value in excess of zero can be expected. For $n = 100$ and at the 0.01, 0.05 and 0.10 level of significance the null hypothesis $\phi = 1$ (i.e. the e_t s are non-stationary) should be rejected if the Durbin-Watson statistic exceeds a value of 0.511, 0.386 and 0.322 respectively. Similarly to the stationarity tests, the co-integration tests have some problems too. In particular, the critical values for the Co-integration ADF Test depend on the number of the included lags l . Equally, the CRDW Test only works well when the disturbances in the co-integrating regression really follow a first-order scheme. It has, however, very different critical values for alternative specifications (THOMAS 1993, p.166). Therefore, these tests cannot be considered as precise and again need to be applied with care.

The estimation of ECMs implies an underlying equilibrium relationship and it can be proved (see ENGLE & GRANGER 1987) that, provided the employed variables are co-integrated (i.e. an equilibrium relationship exists), then the short-run 'disequilibrium' relationship between the variables can always be represented by an ECM. This result is known as the *Granger Representation Theorem*. The actual estimation process of an ECM can be done in two distinct ways (see THOMAS 1993, pp.167-168).

(1) A *two-step procedure* as suggested by ENGLE & GRANGER (1987) where in a model such as
$$\Delta y_t = \sum_{i=1}^n \beta_i \Delta x_{it} - (1 - \alpha) \left[y_{t-1} - \gamma_0 - \sum_{i=1}^m \gamma_i x_{it-1} \right] + u_t$$
 the long-run parameters γ_0 and γ_i are obtained by the application of OLS to $y_t = \gamma_0 + \sum_{i=1}^m \gamma_i x_{it}$, i.e. the co-integrating regression. The residuals from this regression, the e_t s, are then substituted into the ECM in place of the disequilibrium errors. Thus, the second step involves the application of OLS to
$$\Delta y_t = \sum_{i=1}^m \beta_i \Delta x_{it} - (1 - \alpha) e_{t-1} + u_t$$
 by which the short-run parameters β_i and α are obtained. However, there is one problem with this procedure. In a small sample the disequilibrium errors e_t s can be substantially biased (i.e. they are a bad approximation of the true e_t s), and this bias carries over into the second stage where it can lead to a serious small sample bias in the estimation of the short-run parameters. A second problem with the two-stage estimation process of an ECM can result when more than one explanatory variables are included in the estimation process. In this case it is possible that more than one linear relationship exists with variables being integrated to the same order, i.e. more than one co-integrating vector exists (THOMAS 1993, p.170). It is then not clear which of these linear combinations should be treated as *the* long-run equilibrium relationship and used to generate the residuals for the second step of the Engle-Granger procedure. Therefore, an alternative to the two-step procedure has been proposed by WICKENS & BREUSCH (1988).

(2) The *ECM is estimated directly*, i.e. OLS is applied to a specification such as
$$\Delta y_t = \beta_0 + \sum_{i=1}^m \beta_i \Delta x_{it} - (1 - \alpha) y_{t-1} + (1 - \alpha) \sum_{i=1}^m \gamma_i x_{it-1} + u_t$$
 where $\beta_0 = \gamma_0 (1 - \alpha)$. The estimates of the long-run parameters γ_i can then be obtained from the ratio of the estimated coefficients of x_{it-1} and y_{t-1} . Similarly, an estimate of γ_0 is obtained from the ratio of the β_0 to the coefficient of y_{t-1} . A comparison between both methods revealed that the estimators of the short-run parameters are identical whereas this is not true for the estimators of the long-run parameters. However, there is some evidence that the small-sample bias is smaller in the direct estimation procedure than it is in the two-step procedure (THOMAS 1993, p.168). Therefore the direct estimation procedure may be seen as a more feasible approach for the practical estimation process of an ECM.

B) Data discussion

Unreliable or inappropriate raw data will not provide valuable results, even if the most sophisticated econometric models are used in the estimation procedure. Therefore, in the following, some room is given to a brief discussion of the data used in the regression analysis. (The raw data are provided in Appendix I.)

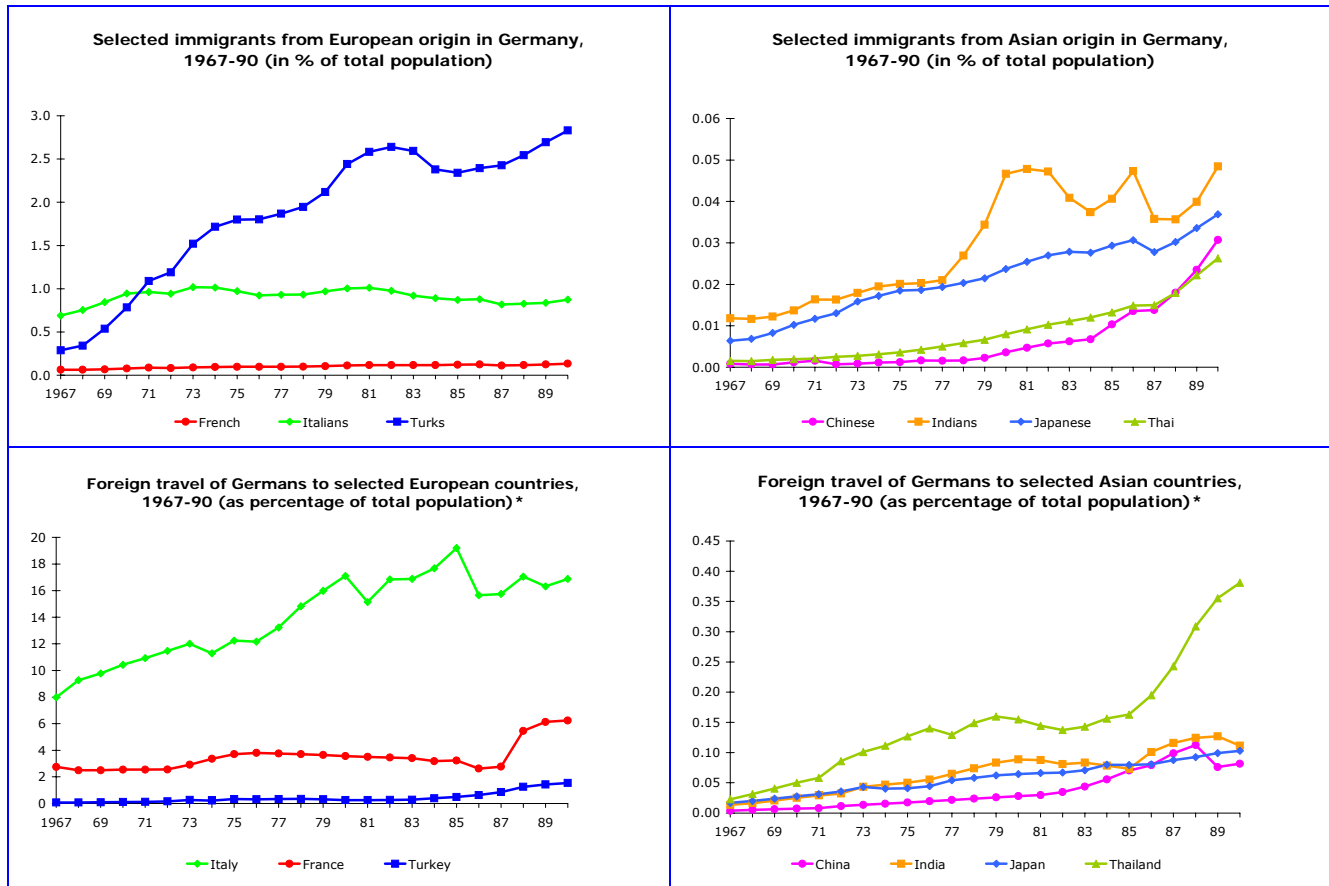
The estimation period 1967 to 1990 was imposed by the availability of appropriate data. Unfortunately, continuous time series for foreign citizens living in Germany are only available from 1967 on. This is a problem, as it prevents the analysis for the late 1950s and early 1960s, a period with a relatively high intake of foreign workers. It is especially a problem for the case of Italy, one of the largest supplier of food products to Germany, as in 1967 Italian immigrant levels were already near their peak values of 1973-75, i.e. the whole period with strongly rising immigrant intakes from Italy could not be analysed. Thus, 1967 was the lower limit for all time series entering the estimation process. An upper limit was imposed by the German reunification event in 1989 and the switch in the published statistical times series of West Germany to reunified Germany from 1991 onwards. This resulted in a structural shift in most of the employed time series (as many of them have been specified in per capita terms), but is especially true for the per capita GDP series. Moreover, for the food import data series (i.e. the dependent variables) a change in the measurement methodology by the German Bureau of Statistics in 1993 made comparability of the data from this year on to the previous years difficult and thus led to another structural shift. Although it was tried to account for these shifts by the use of dummy variables that were introduced into the regressions, the resulting estimations did in fact not improve but rather deteriorate. The reunification process may in fact have had a too big impact and the few observations available (1991-96) for the years after this shift may not have been enough to allow the statistical model to adapt to the new situation. Therefore, the estimation period for all regressions was limited to the period of 1967-90.

Data for immigration and tourism came from the German Bureau of Statistics (for immigration) and the World Travel Organisation in Geneva (for international tourism activity). For the latter there are in fact two suitable indicators that could be used: (1) tourists arrivals at the frontiers of the countries, or (2) the numbers of nights spent by tourists in formal accommodation. However, in both series, unfortunately, comparatively many missing values are present. It was found that arrivals at borders were a more suitable and reliable measurement for international travel activity mostly because they include also travellers with caravans, backpackers and people staying privately with the home population and because the completeness of the data seemed to be better. Nevertheless the data cannot be considered to be a very reliable measure. Although missing values were replaced by linear interpolation procedures, the tourist data for France in particular displayed some inexplicable 'breaks'. In general, these series may only be suitable for reflecting changes in overall levels over time but they may not be reliable for accurately reflecting possible short-run effects.⁴⁴ Figure 13 shows the development of immigration into Germany and the foreign travel activity of Germans to selected countries for the period 1967-90. All data are displayed in relative terms, i.e. per head of population in order to control for population growth. Apart from Italian and French immigrants, all series show substantial upward trends. Especially strong growth rates can be found in both immigration from and

⁴⁴ In fact, the statistics itself, the measurement methods and the presentation of the data changed considerably during the years. Even the name of the publication changed frequently starting as *International Travel Statistics* (until 1974), and was then called *World Travel Statistics*, *World Tourism Statistics*, and *World Tourism and Travel Statistics*.

foreign travel to Asian countries, although the levels of these flows are still considerably lower when compared to the displayed European countries.

Figure 13: Immigration to Germany and foreign travel of Germans by selected countries, 1967-90



Note: *Number of travellers divided by total population for each year to control for population growth. Missing values replaced by linear interpolation.

Sources: Raw data from the Statistisches Bundesamt (German Bureau of Statistics), *Fachserie 1, Reihe 2*, 1997; World Travel Organisation, *World Travel Statistics*, various yearbooks.

Data for German food imports came from the German Bureau of Statistics published in the Statistical Yearbook of Germany for Food, Agriculture and Forestry (*Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten der Bundesrepublik Deutschland*). From all available food import data two specifications of published time series in particular have been found as possibly suitable for the regression analysis. (1) In order to check for any connection between aggregate food imports at the country level and tourism activity and immigration, total food imports (including coffee and tobacco) have been used. Although it seems unlikely to find significant connections between these activities and the highly aggregate food imports, there may be some chance of detecting it in the case of certain Asian countries. Food items from these countries have only recently emerged on a large scale in supermarkets and Asian specialty shops in Germany. Furthermore, most of these countries are geographically located in the tropical or sub-tropical zone, thus their agricultural commodities and foods products are considerably distinct from those of Germany, i.e. substitutability between the products of the Asian countries and Germany can be assumed as low. That is, it is not likely that e.g. Thailand has emerged as a new potato, wheat or pork supplier, etc. for

Germany.⁴⁵ Moreover, as it can be seen in Figure 14, there is a high (simple) correlation between the increase in food imports from these countries and the growth of German tourism activity to and immigration into Germany from there. In fact, as long as these imports mostly represent final consumer products and not agricultural raw commodities (e.g. cereals, feeding stuffs for animals, etc.), or intermediate products for further processing (e.g. rice flour), there may be a good chance of finding some significant influence of tourism activity and immigration on the import flows. In fact, a look at the export structure of these countries (see Table 17) reveals that in 1995 the spectrum of exported foods was quite broad, including agricultural commodities such as meat, fresh (shell) fish, rice, sugar or fresh vegetables, as well as more consumer oriented food products such as cereal preparations, confectionery, spices, beverages, or food preparations. Of course, the figures given in the table do not show how the situation was in 1967, nor how it eventually changed through to 1990. Furthermore, it cannot be seen what proportion of the individual food groups actually ended up as being imported into Germany. However, these figures can provide a first examination of the commodities and food products that these countries supply onto the world markets.

Table 17: Food export structure of selected Asian countries (incl. Turkey) in 1995

	<i>India</i>	<i>Thailand</i>	<i>China*</i>	<i>Turkey</i>	<i>Japan</i>
Total food and tobacco exports in US\$ million	5 484.3	10 747.5	10 923.0	3 796.3	1 558.1
Shares (in %) of individual food product groups in total food and tobacco exports					
Meat and preparations			12.6		
Shell fish fresh, frozen	14.5	22.4	9.4		
Fish etc prepd, prsvd, nes		14.8	7.2		
Rice milled, unbroken	24.7	16.6	0.1		
Wheat meal or flour				3.8	
Cereal etc preparations				6.1	
Veg etc fresh, smply prsvd			12.6	12.4	
Veg etc prsvd, prpd		2.2	10.5	5.1	
Fruit, nuts fresh, dried	8.1		4.1	31.9	
Fruit preprd, prsvd, nes		3.4	4.0	7.9	
Raw sugar		7.7			
Sugar candy non chocolate				4.9	
Chocolate and products				2.1	
Edible products, preps nes		2.5		1.5	
Spices	3.3				
Coffee green, roasted	6.7	1.7			
Tea	6.3		2.5		
Beverages				2.3	
Tobacco	2.4	0.5		10.0	
Feeding stuff for animals	12.9	2.2	3.2		

Notes: Selected commodities and products. Missing values either not provided in source statistics or very small.

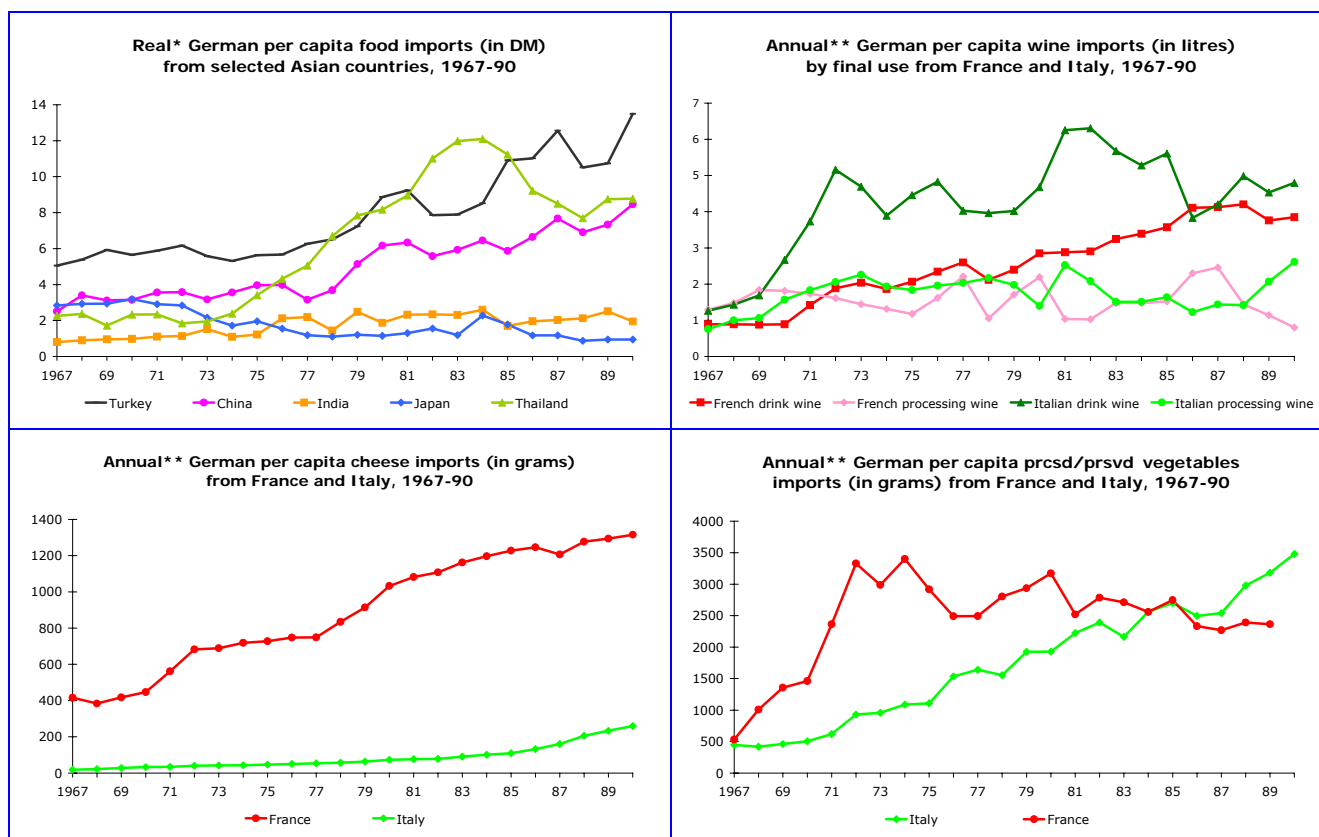
*For China see also Table 6. nes = not elsewhere specified.

Source: Author's calculations from United Nations, 1996 *International Trade Statistics Yearbook — Volume I: Trade by Country*, 1997.

⁴⁵ Furthermore, rising imports of the agricultural raw commodity rice may quite possibly be related to increasing tourism activity or rising Asian immigration into Germany (indicated e.g. by an increase in Chinese restaurants), since Asian rice varieties (such as Basmati, Jasmin, Japanese sticky rice etc.) are quite distinctive in their use as compared to European or American varieties. That is, these Asian rice varieties are likely to be used only in Asian dishes and thus only by people who have an interest in Asian food. Moreover, other typical Asian food products such as tropical spices & vegetables (e.g. bamboo or bean sprouts), soy-, fish- or mushroom sauces, coconut products, rice noodles, etc. can hardly be replaced in the food preparation process by locally produced German ingredients, thus an increasing interest of the German population in Asian foods is almost inevitably linked to rising food product imports from these countries.

Another problem with these series is that they are listed in millions of DM, i.e. in nominal monetary terms. Therefore they needed to be deflated (see next paragraph) and transformed to a per capita basis.

(2) As already argued in the previous theoretical part, a higher likelihood of finding some evidence for the effects of tourism and immigration on food imports may be expected at the individual commodity level. Import data with country of origin listings are available for eggs and dairy products (butter, cheese and soft cheese), oils and fats, meats, bottled or tinned fruit and vegetable preparations, fresh citrus fruits and vegetables, and wine (for drink or processing use). From these goods, imports of agricultural raw commodities such as eggs, butter, meats and fresh fruit and vegetable are not likely to display a significant connection with immigrant or tourist flows and thus were not included in the regression analysis. Furthermore, for most of the others, more highly processed products such as cheese, oils and fats, and fruit and vegetable preparations, it is not clear what amount of the imports are actually final consumer food products, and what percentage of the imports are used as intermediate products for further processing. Although there may be a strong *a priori* expectation that e.g. imports of Italian tinned tomatoes, or conserved artichokes or olives, or bottled olive oil may be highly related to international migration and tourism activities, this connection can be far less expected when these products are used to a large extent in further industrial food processing (e.g. deep frozen pizza production), and if substitute procurement origins exist (e.g. North Africa for olives and olive oil). The same may be true for cheese: the German imports of French cheese marketed as final consumer products may be strongly related with German tourism activity to France, or French immigration into Germany. However, total imports may also contain a considerable fraction of industrially produced cheese for grating or other processing which could, for example equally be supplied by Switzerland, Austria or Bavaria (and buying behaviour of industrial processors can be expected to be much more price sensitive, i.e. volatile). Therefore, the connection between total cheese imports from France and tourists to France, or French immigrants in Germany, may turn out to be much less significant than expected. In fact, there are import data for only one product, namely wine, which are differentiated by final use (drink or processing), and where a clear *a priori* hypothesis can be formulated: the connection between tourism and immigration and imports should be much more significant for the drink wine imports than for the processing wine. Unfortunately, for the chosen time period complete import, tourism and immigration, or financial data was only available for two countries: Italy and France. However, these countries are the most important world wine producers which together provide, depending on the year, between 50% and 80% of total wine imports to Germany. Another advantage with the individual commodity series is that they are specified in physical terms (tons or hectoliters etc.). That is, there is no risk of them displaying biasing monetary inflation movements during the estimation period. Figure 14 shows real per capita total food imports from selected countries and imports of selected food products for different countries from 1967-90. Apart from aggregate food imports from Japan (downwards trend) and imports of processing wine (no distinct trends), all time series display substantial upwards trends during the chosen period.

Figure 14: Real German per capita imports from selected countries and of selected food products, 1967-90

Notes: *Deflated with the German index of food import prices; Imports include coffee and tobacco.

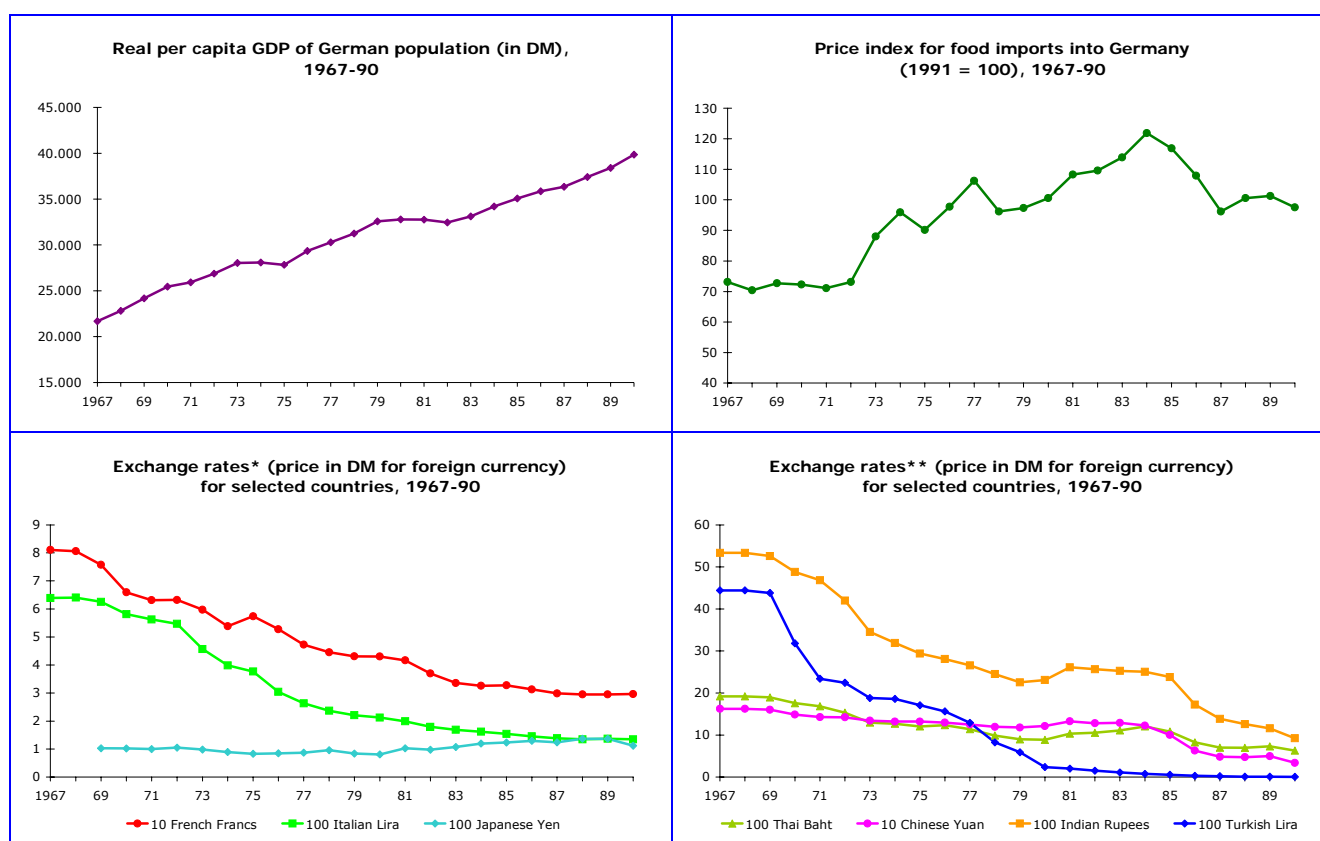
**Agricultural years.

Source: Raw data from the German Bureau of Statistics published in *Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten der Bundesrepublik Deutschland*, various issues.

Financial data such as GDP, exchange rates, and price indices came from the International Monetary Fund (IMF), the German Federal Reserve Bank (*Deutsche Bundesbank*) and the German Bureau of Statistics. The GDP series is based on 1991 prices. That is, inflationary effects have been removed. Unfortunately, no price indices for food imports from individual countries were available. There is only a general price index for all food imports published by the German Bureau of Statistics which is the average price tendency for all countries. This index was used in all regressions as a price indicator, as all country's specific food import prices, or the import prices of individual commodities, should be correlated with this aggregate. However, in order to account for individual country price effects, country specific exchange rates have been introduced into the regressions. Long-term time series of exchange rates on a DM basis for the countries of interest for this analysis were only available from the German Federal Reserve Bank for the Italian Lira, the French Franc, and the Japanese Yen. For India, Thailand, China, and Turkey exchange rates on a US-\$ basis published by the IMF have been used. These rates have been transformed into DM values by using the IMF DM per US-\$ exchange rate series. No measure has been found to reflect prices for home produced foods as a substitute for food imports. All available price indices include food in general, i.e. they do not differentiate between food produced in Germany and imported foods. However, as argued in the theoretical part above, the price differences between both prices can be expected as small and are not assumed to influence the food choice significantly. Thus, the influence of substitute prices may be neglected.

In order to deflate the nominal food imports from Asian countries, two possibilities were considered. (1) The use of the general price index for food imports. This is quite a rough measure, however it reflects the fact that world production of food over the examined period has become more efficient, and thus food in real terms has become more inexpensive. (2) The use of country specific GDP-deflator series, as the price development of food exports should at least weakly be correlated with a country's general price development. However, this measure has not been available during the whole period for most of the countries of interest such as India, China, or Turkey. For Thailand, where this measure was available, the general price index, the GDP deflator and the mean of both series have been used to deflate the imports from this country. The resulting regression coefficients have not been found to differ significantly, therefore — and in order to have a more systematic approach — the general price index has been used to deflate food imports from all countries used in the analysis. Figure 15 displays the financial data used, i.e. income and price variables. Apart from the price index and the exchange rate for Japanese Yen, all time series show distinctive upward (real per capita GDP) or downward trends (exchange rates).

Figure 15: Financial data (per capita GDP, food imports price index and exchange rates) for Germany, 1967-90



Notes: * Data originally published in DM;

** Data transformed from US\$ into DM using the IMF DM-US\$ exchange rate.

Sources: International Monetary Fund (IMF), *International Financial Statistics Yearbook*, various issues, for the raw data of GDP and right-hand graph exchange rates.

Statistisches Bundesamt (German Bureau of Statistics), *Fachserie 17, Reihe 8*, 1996, for the price index.

Deutsche Bundesbank (German Federal Reserve Bank), *Devisenkursstatistik — Statistisches Beiheft zum Monatsbericht 5*, November 1995, for the left hand graph exchange rates data.

In summary, the available data may not be optimal for explaining aggregate food imports, or imports of selected food products into Germany. The only feasible deflation methods may be too crude, mostly because of the use of only one general price index and not of country specific deflators. Furthermore, price effects cannot be taken into account appropriately due to the non-availability of suitable import price series for individual countries or food products. Finally, the available tourism data does not seem to be very accurate and reliable, especially for reflecting possible short-run effects. Nevertheless, all indicators should at least be roughly correlated with the "true" changes over time, and thus regression analysis still seems to be justified.

C) Regression results

The following research strategy has been employed to explore potential positive effects of international tourism activity of Germans and foreign immigration into Germany on food imports from selected countries and for selected food products. Tests for normality and stationarity of the employed variables have been conducted before the estimations. In all estimated models only (natural) logarithms of the variables have been used. All variables have been found to be sufficiently normally distributed and most of them to be integrated of order 1, i.e. $I(1)$ (see Appendix I for details). All models have been controlled for multicollinearity (*VIF* coefficients are provided in Appendix I)⁴⁶ and regression residuals have been checked for normality, linearity, and heteroscedasticity (*null plots* are provided in Appendix I). All long-run coefficients have been *directly* estimated (i.e. the two-stage procedure has not been used), as discussed in Section A. Tests for co-integration have been conducted for all specified underlying long-run relationships of the estimated error-correction models using the Co-integration Dickey-Fuller Test (see Section A). Not all tested long-run relationships have been found to be co-integrated. All regressions were run using SPSS 9.0.

First, aggregate food imports from selected Asian countries (including Turkey) have been analysed. For these countries the imposed estimation period seemed to be well-suited, as in it falls strong growth of foreign tourism activity to these countries and immigration from them. Furthermore, given the assumed relative weak substitutability of these countries' agricultural production with the German one, the aggregate food imports from these countries are assumed to be composed to a higher extent of consumer oriented food products. First, a purely economic error-correction model has been estimated using only real per capita GDP, the price index for food imports, and country specific exchange rates. The purely economic model has then been tried to be improved by eliminating variables, however only and strictly according to the following criteria: (1) as all the entered variables are coherent with economic theory, or at least their long-run effects are, the first differenced terms have been removed first. These variables simply reflect short-run dynamics, about which theory typically has nothing to say, thus their elimination does not involve

⁴⁶ The *variance inflation factor* (*VIF*) is a measure for assessing both pairwise and multiple variable collinearity. It is the inverse of the *tolerance value* (i.e. $VIF = 1/TOL$) and both values show to which extent each independent variable is explained by the other independent variables. *Tolerance* is the amount of variability of the selected independent variable not explained by the other independent variables. Thus, very small *tolerance* values (i.e. high *VIF* values) denote high collinearity. A *VIF* values above 5.3 indicates a multiple correlation with this variable of more than .90. However, a commonly accepted cut-off threshold is a *VIF* of 10 (corresponds to a multiple correlation of .95) (HAIR *et al.* 1998, p.192-193). Both measures, however, do not indicate which variables are intercorrelated. For this problem, SPSS provides a special multicollinearity diagnosis statistics which is based on a *coefficient variance decomposition analysis* (for more information see *ibid.*, p.220-221). This statistics has been checked in all regressions, and it was found that hardly any regression suffered from multicollinearity problems severe enough to exceed the statistics' cut-off thresholds. Therefore, these (paper filling) tables are not included in the appendix.

violations (THOMAS 1993, p.156). Only in cases in which the lagged variable displayed the wrong sign, was highly insignificant, had a low partial and part correlation with the dependent variable (see point 4), and the model could significantly be improved by eliminating this variable, also the long-run specifications (i.e. the lagged variables) were removed. (2) The differenced term displayed a sign incoherent with economic theory. (3) The differenced variable was highly insignificant (as measured by the *t*-value). (4) The differenced variable was only weakly correlated with the dependent variable, as measured by the *partial* and *part correlation* coefficients.⁴⁷ The next step involved the inclusion of the tourism and immigration variables into the purely economic model, and then it was tried to improve this model by eliminating implausible and insignificant effects according to the criteria just listed. The estimated tourism and immigration models were then compared to their purely economic specifications, and the quality of the estimated models was judged by using the *adjusted R*², the *F*-test value, and the plausibility and significance of the estimated variable coefficients, using the common *t*-test. If a tourism and immigration model proved superior to its purely economic specification according to these criteria, then this was seen as proof of the explanatory power of the tourism and immigration variables (or at least of one of them).

Second, imports of individual food products from France and Italy have been analysed. In particular, wine for drink and processing use, cheese and processed and preserved vegetables were chosen, as these products could be considered as consumer food products (with the exception of processing wine). A further selection criteria was the availability of complete import data time series for these products during the estimation period. The same research strategy as above has been employed to test for the significance of the influence of immigration into Germany and international tourism activity of Germans on import flows of the selected food products into Germany. The first step involved the estimation of a purely economic import demand specification, using income, prices and exchange rates only. Then, the tourism and immigration variables were included and the new model was checked for significant statistical improvement over the purely economic specification. To do this, the same criteria as just listed above were used. Table 18 to Table 23 list the regression results for German aggregate food imports from selected Asian countries and for the German imports of selected food products from France and Italy.

⁴⁷ As explanatory variables are usually intercorrelated, they "share" some of their predictive power. The partial and the part correlation coefficients allow for the measurement of the "net" effect of an independent variable on the dependent variable in the presence of other independent variables. The *partial correlation coefficient* measures the strength of the relationship between an independent variable and the dependent variable in the presence of other independent variables, but the effects of these held constant. By contrast, the *part correlation coefficient* is used to apportionate variance among the independent variables. Its squared value gives the unique variance of the dependent variable explained by an independent variable (HAIR *et al.* 1998, p.190-91). Thus, a low part correlation means that an independent variable is relatively unimportant because it explains only a small part of the *total* variance of the dependent variable. A low partial correlation means the independent variable only explains a small part of the *remaining* variance, not already explained by the other independent variables present in the model. However, both coefficients are usually highly correlated, so that a low part correlation coefficient involves a low partial correlation coefficient.

The overall model significance for all estimated regressions (with the exception of aggregate imports from Japan) is high, i.e. it is at least significant at the 95% level of significance. In all models (with the exception of Japan again) the inclusion of the tourism and immigration variables could improve the explanatory power of the models, as measured by the *adjusted R²* coefficient.⁴⁸ However, as expected, the best improvements have been found in the most consumer-oriented food product analysed here, namely wine for drink use. For this food product, a purely economic demand specification could only explain 25.4% of the total variance in the imports of drinking wine from Italy, and 27.7% of the total variance in the imports of drinking wine from France. However, after the inclusion of the immigrant and tourism variables the estimated models were able to explain 72.2% of the total variance of these imports from Italy, and 67.1% of those from France. This stands in contrast with the comparatively low improvements in explanatory power that could be achieved in the imports of wine for processing use from these countries. Here the proportion of the total variance explained by the specified models rose only comparatively little from 40.8% to 51.0% for the case of Italy, and from 35.8% to 55.1% for the case of France. However, it is interesting to find that even for apparently not directly consumer-oriented food products, the immigration and tourism specification indeed improved the explanatory power of the specified models.⁴⁹

The overall model significance for aggregate food imports from selected Asian countries after the inclusion of the tourism and immigration variables has also been found to increase from 63.7% to 87.1% (India), 48.6% to 55.0% (Thailand), 49.9% to 54.6% (Turkey), and 31.2% to 34.8% (China). However, it fell from 31.2% to 23.9% for the case of Japan. As already argued above, these comparatively small improvements could have been expected *a priori*, given the fact that these aggregate food imports are composed of agricultural raw commodities as well as of consumer-oriented food products, with the former not being likely to display a connection with migrant and tourist flows. For the imports of cheese and processed/preserved vegetables from France and Italy, the improvements in the explanatory power of the specified models lie somehow in between those of the drinking wine models and those of the aggregate food imports. As already argued, imports of cheese and the processed/preserved vegetables are likely to represent both, final consumer products and products for further industrial processing, which may explain the differences in the explained total variance in the import flows of the different products. Thus, for German cheese imports from France a purely economic specification has been found to explain 40.0% of the total variance, whereas after the inclusion of the tourism and immigration variables it was 69.8%. However, for cheese imports from Italy the improvement was considerably smaller, up from 42.7% to 48.0%. On the other hand, imports of processed/preserved vegetables from Italy have been found to be much stronger related to tourism and immigration flows than those from France, with total variance explained increasing from 36.3% (Italy) and 39.2% (France) to 61.4% and 41.9% respectively.

⁴⁸ The *adjusted R²* or \bar{R}^2 is a more appropriate 'goodness of fit' measure than R^2 for the comparison of models with a different number of explanatory variables m (or for models that differ in the number of observations n). The reason is that \bar{R}^2 does not necessarily rise when more variables are included in a model as R^2 does. In fact, \bar{R}^2 will fall when variables with no explanatory power are introduced into a model, and it can even take negative values. (For a formal definition of both measures see GUJARATI 1995, p.207-211, or THOMAS 1993, p.36.) Note further that the comparison of R^2 or \bar{R}^2 between different models is only justified when the dependent variable Y is the same in the compared models (*ibid.*). This, however, is true for all compared regression pairs in this study.

⁴⁹ This might be explained by the fact that at least a small proportion of the processed products still ends up as being marketed as consumer food product with country of origin declaration. For example, some large German food product manufacturers sell vinegar made from red or white wine from Italy or France within their ethnic cuisine product lines.

Table 18: Regression estimates of an error-correction model for aggregate German food imports from selected Asian countries, 1967-90, purely economic specification

$\Delta y_t: \Delta IMP_t$	Short-run parameters				Long-run parameters					Model statistics			
	ΔGDP_t	ΔIPX_t	ΔEXR_t	$(1-\alpha)$	IMP_{t-1}	γ_0	GDP_{t-1}	IPX_{t-1}	EXR_{t-1}	n	adj. R^2	F^\dagger	Co-integration*
India	2.217 (1.262)	.023 (4.032)		-1.203	[(-5.560)	-18.232 (-4.572)	1.274 (3.662)	.010 (2.492)	]	23	.637	9.058 [.000]	CI(1, 0)
Thailand	1.352 (.896)		.718 (2.343)	-.495	[(-4.908)	-4.564 (-3.324)			-.640] (-2.408)	23	.486	5.350 [.003]	no
Turkey	.582 (.643)	-.005 (-1.791)	-.182 (-1.685)	-.747	[(-3.565)	-2.464 (-3.490)			-.127] (-3.317)	23	.499	3.561 [.020]	CI(1, 0)
China		-.006 (-1.510)		-.515	[(-3.009)	-23.691 (-3.010)	2.001 (2.983)		]	23	.312	4.472 [.015]	no
Japan [‡]	-4.461 (-1.517)	.011 (1.319)		-1.017	[(-3.778)	56.276 (3.372)	-5.039 (-3.270)	.011 (1.582)	.725] (1.626)	20	.312	2.514 [.073]	CI(1, 0)

Table 19: Regression estimates of an error-correction model for aggregate German food imports from selected Asian countries, 1967-90, tourism and immigration specification

$\Delta y_t: \Delta IMP_t$	Short-run parameters						Long-run parameters						Model statistics				
	ΔGDP_t	ΔIPX_t	ΔEXR_t	ΔTOU_t	ΔIMM_t	$(1-\alpha)$	IMP_{t-1}	γ_0	GDP_{t-1}	IPX_{t-1}	EXR_{t-1}	TOU_{t-1}	IMM_{t-1}	n	adj. R^2	F^\dagger	Co-integration*
India	4.904 (3.138)	.013 (2.796)		.439 (1.500)		-1.232	[(-6.953)	21.845 (2.201)	-1.792 (-2.295)	.004 (1.294)		.701 (3.699)	.332] (2.659)	22	.871	11.836 [.000]	CI(1, 0)
Thailand	2.155 (1.262)		.495 (1.642)	-.689 (-2.342)	-.787 (-1.429)	-.487	[(-4.722)	3.294 (2.343)		-.027 (-3.140)	.772 (2.505)		]	22	.550	4.839 [.005]	no
Turkey	1.211 (1.093)	-.004 (-1.434)			-.433 (-1.553)	-.995	[(-5.003)	-50.222 (-4.427)	4.346 (4.369)	-.003 (-1.061)		-.202 (-2.631)	-.464] (-3.531)	22	.546	4.306 [.008]	no
China					.131 (1.277)	-.816	[(-3.874)	-20.124 (-1.850)	1.707 (1.832)			-.268 (-1.587)	.265] (2.904)	22	.348	3.343 [.028]	no
Japan [‡]	-2.696 (-.932)	.010 (1.072)	-.750 (-1.342)			-.842	[(-3.117)	30.819 (.933)	-3.099 (-1.269)	.014 (1.221)			-.588] (-.624)	20	.239	1.896 [.152]	CI(1, 0)

Source: Author's calculations.

Notes: Error-correction model specification: $\Delta y_t = \sum_{i=1}^m \beta_i \Delta x_{it} - (1-\alpha) \left[y_{t-1} - \gamma_0 - \sum_{i=1}^m \gamma_i x_{it-1} \right] + u_t$. All variables used in natural logarithm form only.

IMP_t = Aggregate German real per capita food imports from listed country
 TOU_t = Tourists from Germany into foreign country per 100 of German population
 IMM_t = Immigrants from foreign country per 100 of German population
 Δ = first difference, i.e. $\Delta y_t = y_t - y_{t-1}$

(t-values) in parentheses. Coefficients significant at the 5% level of significance (or higher) in **bold** print.

*Co-integration Dickey-Fuller Test for the specified long-run relationship. For details refer to Appendix I.

GDP_t = German real per capita gross domestic product
 IPX_t = Index of food import prices
 EXR_t = Exchange rate in DM per foreign currency
 $t-1$ = lagged by one period.

[†] Model significance in square brackets.

[‡] For Japan: 1969-90.

Table 20: Regression estimates of an error-correction model for German imports of drink and processing wine from Italy and France, 1967-90[‡], purely economic specification

$\Delta y_t: \Delta IMP_t$	Short-run parameters				Long-run parameters					Model statistics			
	ΔGDP_t	ΔIPX_t	ΔEXR_t	$(1-\alpha)$	IMP_{t-1}	γ_0	GDP_{t-1}	IPX_{t-1}	EXR_{t-1}	n	adj. R^2	F^+	Co-integration*
Italy drink				-0.338 [(-2.580)	-68.319 (-2.116)	6.611 (2.138)			1.603 (2.111)	23	.254	3.606 [.031]	no
Italy process.	1.956 (1.036)			-0.662 [(-4.083)	-58.441 (-3.070)	5.572 (3.083)			1.434 (2.988)	23	.408	4.958 [.007]	no
France drink		.632 (1.585)	.464 (.829)	-0.567 [(-3.411)	-29.415 (-3.217)	2.941 (3.238)				23	.277	3.201 [.036]	CI(1, 0)
France process.	3.442 (1.155)		-1.203 [-.987]	-0.735 [(-3.262)	.198 (.958)					23	.358	5.272 [.008]	no

Table 21: Regression estimates of an error-correction model for German imports of drink and processing wine from Italy and France, 1967-90[‡], tourism and immigration specification

Δy_t : ΔIMP_t	Short-run parameters							Long-run parameters					Model statistics				
	ΔGDP_t	ΔIPX_t	ΔEXR_t	ΔTOU_t	ΔIMM_t	$(1-\alpha)$	IMP_{t-1}	γ_0	GDP_{t-1}	IPX_{t-1}	EXR_{t-1}	TOU_{t-1}	IMM_{t-1}	n	adj. R^2	F^+	Co-integration*
Italy drink				1.100 (3.309)	-1.601 (-2.301)	-0.690	[(-5.543)	21.194 (5.831)		-1.763 (-3.857)		1.858 (4.791)	1.712 (3.278)	22	.722	10.502 [.000]	no
Italy process.	5.425 (2.002)				2.080 (2.054)	-1.113	[(-4.517)	-16.556 (-2.343)	2.722 (3.541)			-1.443 (-3.127)	2.979 (3.485)	22	.510	4.810 [.006]	no
France drink	1.428 (1.347)	.514 (1.776)	.902 (2.358)			-0.685	[(-5.803)	21.815 (5.323)		-.480 (-1.349)		-.268 (-2.041)	2.841 (6.071)	22	.671	7.416 [.001]	no
France process.	4.254 (1.663)			-.686 (-1.957)		-0.912	[(-4.207)	-12.708 (-2.371)	.912 (2.059)			-1.055 (-3.187)	]	22	.551	6.650 [.001]	CI(1, 0)

Source: Author's calculations.

Notes: Error-correction model specification: $\Delta y_t = \sum_{i=1}^m \beta_i \Delta X_{it} - (1-\alpha) \left[y_{t-1} - \gamma_0 - \sum_{i=1}^m \gamma_i X_{it-1} \right] + u_t$. All variables used in natural logarithm form only.

IMP_t = German per capita wine imports by final use from listed country (in litres)

TOU_t = Tourists from Germany into foreign country per 100 of German population

IMM_t = Immigrants from foreign country per 100 of German population

Δ = first difference, i.e. $\Delta y_t = y_t - y_{t-1}$

(t -values) in parentheses. Coefficients significant at the 5% level of significance (or higher) in **bold** print.

*Co-integration Dickey-Fuller Test for the specified long-run relationship. For details refer to Appendix I.

GDP_t = German real per capita gross domestic product

IPX_t = Index of food import prices

EXR_t = Exchange rate in DM per foreign currency

$t-1$ = lagged by one period.

⁺ Model significance in square brackets.

[‡] Agricultural years.

Table 22: Regression estimates of an error-correction model for German imports of cheese and processed vegetables from France and Italy, 1967-90[‡], purely economic specification

$\Delta y_t: \Delta IMP_t$	Short-run parameters				Long-run parameters					Model statistics			
	ΔGDP_t	ΔIPX_t	ΔEXR_t	$(1-\alpha)$	IMP_{t-1}	γ_0	GDP_{t-1}	IPX_{t-1}	EXR_{t-1}	n	adj. R^2	F^\dagger	Co-integration*
France cheese	-1.205 (-1.952)	.343 (1.621)		-.589 [	-11.447 (-3.892)	-1.464	1.276 (1.895)		-.467] (-1.320)	23	.400	4.060 [.012]	no
Italy vegetab.	1.299 (1.028)	1.004 (2.677)		-.758 [	-37.864 (-3.017)	-3.105	3.345 (3.280)	.826 (1.484)		23	.363	3.503 [.023]	CI(1, 0)
Italy cheese	1.208 (2.086)	-.318 (-1.979)		-1.111 [	7.718 (-2.068)	3.185		-1.655 (-3.137)	-.890 (-2.995)	23	.427	4.432 [.008]	no
France vegetab.		.990 (1.871)	.934 (1.253)	-.258 [	1.114 (-3.847)	4.180				23	.392	5.733 [.006]	no

Table 23: Regression estimates of an error-correction model for German imports of cheese and processed vegetables from France and Italy, 1967-90[‡], tourism and immigration specification

$\Delta y_t: \Delta IMP_t$	Short-run parameters					Long-run parameters								Model statistics			
	ΔGDP_t	ΔIPX_t	ΔEXR_t	ΔTOU_t	ΔIMM_t	$(1-\alpha)$	IMP_{t-1}	γ_0	GDP_{t-1}	IPX_{t-1}	EXR_{t-1}	TOU_{t-1}	IMM_{t-1}	n	adj. R^2	F^\dagger	Co-integration*
France cheese		.519 (3.386)	.355 (1.921)			-1.008 [	-6.789	-.142 (-.031)	.710 (2.159)		-.254 (-1.553)	-.080 (-1.764)	.957 (4.878)	22	.698	8.253 [.000]	CI(1, 0)
Italy vegetab.	2.431 (2.347)	.773 (3.193)			-1.625 (-3.831)	-.568 [	-4.961	-37.933 (-4.476)	3.715 (4.490)					22	.614	7.987 [.000]	CI(1, 0)
Italy cheese				-.169 (-1.177)	-.793 (-2.172)	-.264 [	-2.183	-66.177 (-2.592)	5.239 (2.287)	-1.407 (-2.220)			-3.451 (-4.403)	22	.480	4.384 [.008]	no
France vegetab.	4.914 (1.918)		1.952 (2.289)		1.602 (1.574)	-.410 [	-2.320	-43.254 (-.802)	5.692 (1.372)		4.918 (2.353)	-1.211 (-2.204)	5.462 (1.762)	22	.419	2.980 [.036]	no

Source: Author's calculations.

Notes: Error-correction model specification: $\Delta y_t = \sum_{i=1}^m \beta_i \Delta x_{it} - (1-\alpha) \left[y_{t-1} - \gamma_0 - \sum_{i=1}^m \gamma_i x_{it-1} \right] + u_t$. All variables used in natural logarithm form only.

IMP_t = German per capita imports of listed product from listed country (in kilograms)

TOU_t = Tourists from Germany into foreign country per 100 of German population

IMM_t = Immigrants from foreign country per 100 of German population

Δ = first difference, i.e. $\Delta y_t = y_t - y_{t-1}$

(t-values) in parentheses. Coefficients significant at the 5% level of significance (or higher) in **bold** print.

*Co-integration Dickey-Fuller Test for the specified long-run relationship. For details refer to Appendix I.

GDP_t = German real per capita gross domestic product

IPX_t = Index of food import prices

EXR_t = Exchange rate in DM per foreign currency

$t-1$ = lagged by one period.

[†] Model significance in square brackets.

[‡] Agricultural years.

The overall variance explained by many of the models can be seen as relatively high, given the following considerations: (i) The chosen model specification is a pure demand side approach. However, this is not a typical, "main-stream" methodology for the analysis of international trade flows. International trade models are very often based on supply side considerations such as wage differences, capital endowments, or measures for the availability of modern production technology. None of these factors have been considered in the investigations of this study. (ii) It has not been controlled for trade distorting influences such as tariffs, quotas, export subsidies, etc. Although it seems unlikely that there have been big differences between these factors on the imports from France and Italy, as both countries belong to the European Union, it may be quite possible that these trade distorting factors may have considerably influenced the trade flows from the investigated Asian countries. Thus, the partly high unexplained variance in the estimated models for the German aggregate food imports from these Asian countries (76.1% for Japan to 12.9% for India) is probably due to differences in either supply side effects or in trade distorting factors. However, the influence of these factors are not of interest for the purpose of this study. (iii) Some international trade models also account for transport costs and differences in physical distance between trading partners. These influences too have not explicitly been considered. (iv) As already argued above, it is much more difficult to explain rates of change rather than changes in levels of economic time series. Many "traditional" trade models have not explicitly controlled for underlying time trends, which account for much of very high 'goodness of fit' (R^2) values. Thus, in order to eliminate influences which are due to trends (i.e. population growth in physical series or inflationary influences in monetary series), and to isolate and analyse the remaining "real" changes, error-correction models and co-integration analysis are needed.

Co-integration of the specified long-run relationship time series has not been found to occur in all estimated models. There are two main reasons for this. First, not all of the long-run time series are integrated of the same order. Whereas most of the time series have been found to be $I(1)$, four out of the seven exchange rate series were found to be neither $I(0)$ nor $I(1)$. Furthermore, two of the immigration series (Turkey and Italy) and one of the tourism series (Thailand) turned out to be $I(0)$ rather than $I(1)$, as were all the other tourism and immigration series. Since one of the conditions for co-integration is that all the series entering the specified long-run relationship must be of the same order, these findings made the existence of co-integration already difficult from the very start. The second condition then demands that the regression residuals from the specified long-run relationship are stationary. Here it was found — using the Dickey-Fuller Co-integration Test — that in three cases, the calculated t -value did not surpass the critical t -value, so the null hypothesis of non-stationarity of the co-integration regression residuals could not be rejected. The problem with these tests for stationarity and co-integration is, however, that they are considered not to be very exact (see theoretical part above) and that some of the tested models failed to exceed the critical values only by a little. Thus, one cannot be completely sure whether the series are really co-integrated or not. Therefore, all models have been included in the result tables regardless if the underlying long-run relationships were found to be co-integrated or not.

Overall, the significance and the correctness of specification of the presented models can be seen as good enough to conclude that there is a significant influence of immigration and tourism activity on selected German food imports, and to justify a closer look at the estimated price and income elasticities of import demand and the quantitative effects of migration and international tourism.

Income elasticities have been found in most of the estimated models to be positive and significantly different from zero. In fact, very often the estimates are very large, even up to 5.239 (long-run elasticity for cheese imports from Italy).⁵⁰ This finding may surprise, however as the estimation period starts back in the sixties and does not include the nineties, it may just underline VON ALVENSLEBEN's (*op. cit.*) argument that income was important for food choice during the sixties and seventies and it has started to lose its significance for food choice decisions during the eighties. On the other hand, income elasticities for food import demand may always be expected to be larger than income elasticities for locally produced food, since many governments actively promote the local production of important staple foods and allow only the import of not so necessarily needed luxury food products from other countries. In general, it appears that long-run income elasticities are higher and more significant than the short-run effects. This makes sense according to economic theory, as it reflects the idea of "permanent income", i.e. with changing income it might take a while until consumers actually adapt their consumption behaviour due to the inertia in their habits.

Price elasticities show a more diversified picture. Economic theory suggests that they have a negative sign (at least import quantity elasticities). Furthermore, they can be expected to be in the inelastic range, i.e. lower than unity. The estimated price elasticities however display negative as well as positive signs and some of them are considerably larger than one. However, for most of German aggregate food imports from Asian countries, these elasticities have been found to not differ significantly from zero. For imports of Italian drink wine and cheese, the long-run estimates take significant values of -1.763 and -1.407 respectively, whereas for imports of French cheese and of Italian processed/preserved vegetables the short-run estimates take significant values of 0.519 and 0.773 respectively. In general, however, price effects are probably not very well represented by the available and thus used data anyway. First, no price-indicator for potential substitute products has been included in the models. Furthermore, the only available price index may not reflect well own-price changes for different countries or different food product. In addition, it is an absolute price measure. That is, it does not reflect real price changes, e.g. relative to income. For example, the price of an imported product may rise over time, but income over the same period may rise by more. Then, in absolute terms, the product has become more expensive, but not relative to available income, and thus demand for this product may increase despite its (absolute) price rise. This fact may help to explain why quite a few of the estimated import price elasticities turned out to have a positive sign. To sum up, given the non-availability of suitable data, the estimated price elasticities may not be seen as very reliable.

Exchange rate elasticities that have been estimated show an even more difficult pattern to explain. Exchange rates were included in the models to account for country specific price effects and thus to complement the included price index variable. Therefore, exchange rate elasticities are expected to be negative and small. However, very often the exchange rate series were not found to improve the models significantly. Where exchange rate series entered the models, the long-run effects turned out to be larger than the short-run effects (see estimates for aggregate imports from Thailand and for processed/preserved vegetables imports from France). This finding may reflect the fact that international food markets take quite a while to adapt to price changes. However, most of the estimated elasticities show a positive sign. In

⁵⁰ This implies that a one percent increase in German per capita GDP in the long-run resulted on average in a 5.24% increase in the imports of this food over the estimation period.

short, the exchange rate variables do not contribute much to the explanation of the variation in international food product trade.

Tourism elasticities may be expected to be positive and long-run effects to be more important than short-run effects. This is because, as argued in the theoretical part above, international tourism activity may be seen as a main driver for changes in tastes in local populations. Changes in preferences may not take place within a single year but there should be a significant (positive) connection between the levels of international tourism to certain countries and imports of certain food products from these destinations. The estimated elasticities confirm that, in general, the long-run effects are stronger and that the biggest influences can be found for imports of wine from Italy and France, and for processed/preserved vegetables imports from France (elasticities in absolute terms above unity up to 1.858). In contrast, for aggregate food imports from Asian countries, the estimates take smaller values (in absolute terms between 0.202 and 0.701). This finding makes good sense, since aggregate import flows are not expected to display a strong association with international tourist flows. This is because the aggregates are composed of both, agricultural raw commodities and consumer food products. However, there is one problem with the estimated tourism elasticities. Many of the parameters are negative. One possible explanation for this is the high collinearity that can be observed between the per capita GDP and the tourism series. It is known from econometric theory that high degrees of multicollinearity result in very sensitive OLS estimators (GUJARATI 1995, pp.331-332), which can result in "regression coefficients being incorrectly estimated and even having wrong signs" (HAIR *et al.* 1998, p.189). In fact, it can be seen in the result tables that whenever the lagged GDP and the lagged tourism series both enter a model, one of the two estimated parameters for these series displays the wrong sign. There is probably not very much that can be done against this problem. Naturally, increases in German per capita GDP will cause increased international travel activities of Germans, thus both series must be highly collinear. At the same time higher imports of exotic foods as a result of increased income can be expected. However, the causal connection is likely to be that more disposable income leads to increased foreign travel, causing more contact with exotic foods in foreign countries which may then lead to increased imports of these products in the following period(s). The second problem with the tourism data has already been discussed above: unfortunately, the available series cannot be considered as a very reliable measure of the real situation. Overall, given all these limitations, it may cautiously be concluded that for some consumer-oriented food products, notably for wine from Italy and processed/preserved vegetables from France, the elasticities of German tourism activity to these countries with respect to the imports of these products between 1967 and 1990 were between one and two. That is, a 1% increase of German tourists to Italy and France resulted in a 1% to 2% increase of German imports of these food products from these countries. For aggregate food imports from Asia, probably depending on the actual composition of the aggregates, the impact of tourism on the import flows has been found to be smaller, i.e. below unity.

Immigration elasticities can also be expected to take positive values. Furthermore, as immigration is supposed to have even two different effects on food import flows, as argued in the theoretical part above, it may be assumed that the estimated elasticities are in absolute terms larger than those of tourism activity. Finally, as for the tourism activities, the long-run effects are likely to be more important than the short-run effects. All these hypotheses are confirmed by the estimated parameters. Furthermore, the data series can be considered as reliable, and collinearity with the GDP series, although present, is much

smaller than for the tourism series. Therefore, the estimated elasticities may be seen as meaningful measures for the promoting effects of immigration activities on the investigated German food import flows. For individual food products the estimated long-run elasticities take absolute values from 0.957 (for cheese imports from France) up to 3.451 (for cheese imports from Italy). The short-run parameters are smaller with most of them lying between one and two in absolute terms. For aggregate food imports from Asian countries the estimated long-run as the short-run elasticities are all smaller than unity in absolute terms. Six of the eight estimated long-run parameters, which have been found to be significant at least at the 95% level of significance, display the expected positive sign. However, only three estimated short-run parameters have turned out to be significant at least at the 95% level of significance, with all three showing negative signs. In sum, it may be concluded that immigration elasticities are in general higher than those for tourism. However, immigration effects were estimated as being smaller than income effects. Immigration elasticities for some of the investigated food products (notably for imports of drink wine from France, and of cheese and processing wine from Italy) have been found to be well above two. However, at the aggregate food import level they take values below unity.

Estimates for $(1-\alpha)$ and the regression constant show mostly the expected pattern. All coefficients of $(1-\alpha)$ have been estimated with the expected negative sign, and most of them are below unity. If they are large, i.e. above unity, than this can be seen as a sign for "overcompensation", which means the error corrections are actually destabilising (THOMAS 1993, p.341). This concern may be true for the estimated regression of aggregate food imports from India, where $(1-\alpha)$ takes an implausible high value of -1.232. Although the series that enter the long-run relationship for this model have found to be co-integrated, the relatively high *DW*-coefficient and the residual null-plot (see Appendix I) generate some doubts concerning a correct model specification. Therefore, this regression, although found to be highly significant, should perhaps be interpreted carefully. For the other two regressions where $(1-\alpha)$ has been estimated in excess of unity (notably for imports of processing wine from Italy (-1.113) and for cheese imports from France (-1.008)), however, there are no other major signs of an incorrect model specification. Except for aggregate food imports from Japan, all $(1-\alpha)$ coefficients have been estimated as highly significant. This result suggests that long-run effects, i.e. information that is in the levels of the employed series, indeed play a significant role in the explanation of the variation in German food product imports. Thus, in almost all estimated models the rates of change measures had to be complemented by trend information, with per capita GDP and tourism and immigration variables having been found to have the largest long-run influence. On the contrary, price and exchange rate effects seem to be more important in the short-run. With regard to the estimated regression constant (γ_0), it can be said that in the context of this study this parameter does not have a special interpretation. However, many estimated γ_0 s have turned out to be significant at least at the 95% level of significance, and many of these estimates are comparatively large.

Directions for further research are manifold. This study has only been a first (and a relatively straightforward) attempt to quantify the effects that international migration and tourism activities may have on international food product trade. There is scope for much more work. Here only selected products or countries have been investigated where there was a strong *a priori* expectation of a positive influence of migration and international tourism activities on German food product imports. In almost all cases (except for aggregate food imports from Japan) these expectations have been confirmed by the empirical results.

However, a more systematic approach would ideally analyse a complete database of individual food product imports for a very long period, and then would cluster the products according to the strength of association with migration and international tourism activity. Ideally, this research then would be conducted for many countries in order to find significant patterns over products or ethnic groups. That is, one would investigate if some ethnic groups really are more prone to engage in this sort of food product trade, and if yes, who are they, and to what extent do their promoting effects depend on food imports from their source countries on the host country they currently live in? Or, are there products such as wine, or bakery, or dairy products whose trade flows are more likely to follow international migration or tourism activities? The results may have valuable marketing implications since they could show export managers of food manufacturing companies whom to target in their export markets. That is, given the assumption that travellers to foreign countries or immigrant groups may take a leading role for the (trans-)formation of tastes of the rest of the population, these groups may be seen as first targets of international marketing activities. This may even be more important in the future, as we know that both international tourism activity and international migration have been growing strongly during the last decades. For policy makers the results of this kind of research could be equally valuable, in so far as if the link between tourism and food product trade flows are found to be significant for a wide range of consumer food products, then export promoting policies for local food industries should take this relationship explicitly into consideration. Thus, promoting tourism to an area would then also mean creating export opportunities for food processors from that region.

In summary, this chapter has tried to shed some light on the demand side contributions to international trade. Although traditional mainstream economic theory has generally focused more on supply side explanations for the causes of international trade, demand side conditions may be more important for the strongly growing international trade in food products — at least for the culturally-bound ones. Theoretically, two standard cases which are based on a traditional Heckscher-Ohlin trade framework, notably the case where trade is based on differences in tastes in otherwise identical economies and the case of non-homogenous tastes, have been presented. However, both cases are built on two different assumptions on the nature of tastes, and it not clear what actually causes the taste structure in a country. Therefore, the role of international migration and tourism activities, as two factors which potentially influence the (trans-)formation of tastes in a country, has been analysed theoretically and empirically. If it is assumed that tastes of (at least some) immigrants are biased versus their source countries' food products, and that tourists to foreign countries may (at least in some cases) develop a taste for the food products of their favourite travel destinations, then there should be a positive connection between international migration and tourism activities and the international trade flows of (at least some) food products. For immigration, there are in theory two effects on food product imports from the source countries of the migrants. First, with rising immigrant levels in a country (which is assumed to lead to an increase in total population), the total demand for food will rise, and given the assumed bias in the tastes of the immigrants versus their source countries' food products, the share of imported food products in totally consumed food will grow as well. Second, more immigrants in an economy may also lead to an increase of e.g. ethnic restaurants, speciality shops, stalls on local food produce markets, ethnic cuisine product lines in supermarkets, etc. The food products supplied via these new channels are likely also to be consumed (at least to some extent) by the local (home) population. Since the total quantity of food consumed in today's affluent, and population-wise non-growing, societies may be seen as fixed, these new ethnic food products will therefore substitute locally produced food. As a consequence, the share of imported food products in totally consumed food rises, too. Thus,

immigrant groups may be seen as catalysts for the change in tastes in the home population. Increased international tourism activities can be seen as another factor that may alter existing tastes of the home population. Here, international travel may lead to more contact with new and exotic food products. If it is assumed that at least some of the tourists wish to consume, back in their home countries, (at least some of) the products that they have experienced in their favourite holiday destinations, then similarly to the second effect of immigration above, there may be a positive connection between rising levels of international tourism and rising shares of foreign food products (i.e. rising levels of imports) in the total consumption of food products. These theoretical hypotheses have been tested empirically for the case of Germany and the period from 1967 to 90. In order to control for trends that are commonly present in time series data — and thus to avoid the problem of spurious correlation — an error-correction model approach has been used. The empirical results are, as so often in this kind of research, not unambiguous. However, for German aggregate food imports from India, Thailand, China and Turkey, and for imports of wine, cheese and processed/preserved vegetables from France and Italy, it may be concluded that migration to Germany and international travel activities of Germans to these destinations have indeed contributed to rising food product imports from these countries. In nearly all cases a model including the immigration and tourism variables improved a purely economic specification — based on income, prices and exchange rates only — by several measures. The tourism elasticities for individual food products have been found to lie between one and two in absolute terms. Also, consistent with *a priori* expectations, they are below unity for aggregate food imports from the analysed Asian countries. As expected, the estimates of the immigration elasticities are higher than those for international tourism activities. In some cases, as for imports of drink wine from France, and of cheese and processing wine from Italy, the immigration elasticities have been estimated as being well above two in absolute terms. Although these empirical results seem to confirm theoretical expectations, there is scope for more research. A more systematic empirical effort would start with a complete database of food product imports and then would try to cluster these products according to their association with international tourism and migration flows. Then this analysis would look for similar patterns in different countries in order to arrive at conclusions of whether some ethnic groups are more likely to engage in activities that make their source countries' food products available in their new home countries, or whether tourists from some countries are more likely to adopt food products from their favourite holiday destinations. These research results could be valuable for both international marketing professionals as for policy makers. Export managers of food processing companies would have effective information about possible crucial target groups for their market entry strategies. Policy makers may learn that, for example, promoting tourism into an area could prove to be an effective means for promoting food industry export success.

2.3.3 Explaining foreign direct investments (FDI) in the food industries

Theoretical analysis of the causes and consequences of FDI⁵¹ is in general more scarce than for international trade. This may be related to the fact that the *multinational enterprise (MNE)* is a relatively recent observation in the international economy. However, its appearance is strongly connected with the process of *globalisation* and thus FDI has been increasingly researched during the last decades (BURNHAM & EPPERSON 1998, p.380). Unfortunately, there are still contradictions in the empirical findings and the picture that emerges is not completely conclusive. However, for some recent work on this subject in the food industries see e.g. GOPINATH *et al.* (1999), HENDERSON (1998), BURNHAM & EPPERSON (1998), ANASTASSOPOULOS & TRAILL (1998), TRAILL (1997), HENDERSON *et al.* (1996b), REED (1996), REED & NING (1996), and NING & REED (1995). In the following, the existing theories and empirical findings will be reviewed and some conclusions will be drawn.

Classification of foreign direct investments can be done twofold. First, (see MARKUSEN 1995, p.170f.) into horizontal and vertical investments. *Horizontal* FDI means that the foreign production of products and services is roughly similar to the those the company produces for its home market and most of the output of foreign production is sold in the foreign country. In contrast, *vertical* investment means the "fragmentation" of the production process geographically, by stages of production. In general, horizontal direct investment is more important quantitatively (*ibid.*, p.171) and there is no reason to assume that it is much different for the food industry. Second, depending on the purpose of FDI, this kind of foreign business activity may be aimed at replacing *actively* existing exports. Typically this may take place when a foreign market grows and demand becomes more stable and predictable. Then, a new plant may be set up in the foreign country and exports will be (partly) replaced by foreign production. On the other hand, there is also the group of *mergers and acquisitions* which may take place as *related* or *unrelated* investments (GOPINATH *et al.* 1999, p.444). 'Related' here means that take-overs are within the core business of the buying company. For example, a take-over could aim to buy an existing plant and to modify it according to the new production process instead of building a completely new production facility. In this case the investment decision may be a substitute for existing exports, too. However, a take-over can also take place in an unrelated business field, e.g. a packaging or a transport company. These kinds of take-overs may take place for a variety of reasons, e.g. financial, strategic, etc., and it not clear what effect (substitutive or complementary) they have on existing exports, if there are such exports at all. Thus, a second classification seems possible according to the effect that FDI has on existing or potential trade-flows, i.e. whether it is either substitutive or complementary to them.

A general approach to explain FDI is related to the fact that FDI is part of a process to efficiently allocate worldwide resources of capital. Global capital stocks should be distributed in a way that the marginal returns on investment are equal in all countries (LINDERT & PUGEL 1996, p.566f.; KEMP 1990, p.119). With such an allocation, world welfare would be maximised. However, this original FDI theory may have more appeal in portfolio investments than in direct investments (NING & REED 1995, p.79). Nevertheless, for an individual company that intends to engage in FDI the marginal return must be higher

⁵¹ In the literature the term *direct foreign investment* (DFI) is also used instead of *foreign direct investment* (FDI).

than the one resulting from serving the foreign market with exports, or there must be some other advantage that outweighs the additional costs of doing business in another country (MARKUSEN 1995, p.173). Thus, FDI decisions generally follow the economic rationale of an efficient use of existing capital.

The location of food processing companies is, in general, the result of a decision on a principal trade-off problem between producing close to input markets, i.e. in the countryside near sources of raw farm products, or near to output markets, i.e. close to the cities and near to consumers. This problem is sometimes expressed in the *law of market area* (LOMA), which states that a production plant should be located where total per unit costs for the whole production and marketing process (including transport costs for inputs and final products, and economies of scale) are minimised (KOHL & UHLS 1998, p.87f.).^{52, 53} Thus, one would expect a concentrated production with one single plant in industries where the gains from economies of scale outweigh the increased transport costs to reach more distant consumer markets. On the other hand, in industries where transport costs are high, and economies of scale are comparatively small, one would expect a multiple production plant structure, with subsidiaries producing near consumer markets. For a decision on FDI versus exports, the problem is similar, however, given the fact that there are "added costs of doing business in another country, including communications and transport costs, higher costs of stationing personnel abroad, barriers due to language, customs, and being outside the local business and government networks" (MARKUSEN 1995, p.173), and other aspects that need to be considered, such as taxation, protection of intellectual capital in form of patents, or management expertise, etc., the complexity of the decision may be much greater. Thus, another theoretical framework is needed.

DUNNING's (1988) OLI framework provides such an organising system which names three conditions that need to be present for a company to have a strong incentive to undertake direct investment: ownership, location, and internationalisation (see also MARKUSEN 1995, p.173f.). An *ownership advantage* for a company could be a special product or a production process, such as a patent, blueprint, or trade secret. It could also be something intangible, such as a trademark or reputation for quality. Whatever its form, the ownership advantage confers some valuable market power or cost advantage on the company

⁵² For a very readable introduction to this topic which sometimes is also called "Spatial Competition", with an application to restaurants, see FRANK (1997, p. 453-470 and 713-720).

⁵³ In fact, this topic is part of a much larger discussion among industrial organisation economists about the geographical location of not only individual companies but whole industries. That is, as above, should production take place near income-rich consumer markets, which, at a country level would mean within industrialised countries, or should manufacturing be located close to cheap factor markets, which could mean in developing countries. According to HENDERSON (1998, p.125-129) the origin of this theory may be seen in the following problem. As the number of companies in the same industry increases at one location, the profitability of all declines. This, because it can be expected that increased competition in that region's product market drives output prices down and in the factor market it drives input costs up. This traditional convention thus leads to predictions of geographical dispersion. However, new ideas have been incorporated into industrial location theory which suggest that concentration of industries into geographical clusters is often a more likely outcome. One approach is to consider the role of labour mobility. KRUGMAN (1991) showed that companies that locate close to high-income markets may pay higher real wages than those that are located in more distant locations and which have on top additional costs to reach consumers. Consequently, the companies located close to their output markets attract labour inflows, which further enlarge the market. The final result may be that companies concentrate around that market rather than disperse geographically. HENDERSON (1998, p.128) argues that "for the food processing sector, size of the home market appears rather consistently to be one of the chief draws, particularly for the large, multinational companies that dominate this sector. That is, food processing is drawn to nations with relatively large, high-income populations." This finding is, not surprisingly, consistent with what we observe in reality. We know, for example that chocolate production or coffee roasting takes place to a large extent in industrialised countries and not where the crops grow. For margarine or pasta it may be similar. However, for primary food processors, such as vegetable oil mills or producers of fruit & vegetable tins (pineapples, tomatoes, etc.) this may be less true. Thus, product characteristics must be considered, too.

sufficient to outweigh the disadvantages of doing business abroad. Moreover, there must be a *location advantage* to be in the foreign market that makes it profitable to produce there rather than to serve the market via exports. Factors, such as tariffs, quotas, transport costs, and cheap factor prices may be important, as is better access to customers. Finally, there must be some sort of an *internationalisation advantage*. If a company has a superior product or production process and if, due to e.g. tariffs or transport costs, it is advantageous to produce the product in the foreign market rather than to export it, it is still not obvious why a company should set up a foreign subsidiary. Alternatively, it could give a license to a foreign company or just sell the blueprints to it, rather than to go through the costly and risky process of setting up a foreign production facility. Therefore there must be some special motivations that outweigh these costs and risks and that is what is referred to as internationalisation advantage. These motivations could for example be (see MARKUSEN 1995, p.181f.) that monopoly rents, due to the superiority of a special product, service or production process, are best exploited if the knowledge is kept within the own company. Moreover, transferring this knowledge to another company, and above all securing its appropriate use by legal contracts, can be very costly, too.⁵⁴ Finally, if product or company reputation (e.g. for special quality) is at stake, a company may prefer to produce by itself rather than run the risk of giving a license to somebody else. Therefore, a subsidiary may be costly but "secure" (*ibid.*, p.184). TRAILL (1997, p.397) suggests that internalisation advantages "simply mean that the transaction costs for the firm are lower with international production than with other market serving forms". He attributes this to a lowered risk and gives for the food industry the example of the growing importance to control "unmeasurable" aspects of food quality, such as food safety, production methods, or origin, but which gain increasing weight by consumers. This view is also supported by HENDERSON (1998, p.130) who argues that especially brand-building in the food industries forces manufacturers to keep production within the company, which allows the firm to gain direct control over its supply and thus enables it to more fully protect its brand reputation. In all, the OLI framework gives some valuable insights in the decision making process of multinational companies but it is limited in so far as it only considers the conditions necessary for direct investment. Also, it does not offer very much on the choice of alternatives, such as licensing versus joint venture versus exporting (MARKUSEN 1995, p.174).

Motives of FDI that can be found in the literature are according to TRAILL (1997, p.397): *Resource seeking*, i.e. to gain access to raw materials, or to stop competitors having access to them. Tropical products, such as coffee, tea, cocoa, or oil plants (coconuts, palms, etc.) may be seen as an example. *Market seeking* is aimed to find new selling opportunities for a company's products. *Efficiency seeking* aims to expand production in order to be able to benefit from economies of scale and scope. Risk diversification and tax avoidance, i.e. the ability to move the headquarter of the company to a country where taxation schemes are most favourable, may also fall under this category.⁵⁵ *Strategic asset seeking* can be motivated by gaining access to specialised labour or R&D facilities which may improve the

⁵⁴ HENDERSON (1998, p.132-134) provides a discussion of the significance of contracts in the US food industries. He argues that the number of contracts has been increased during the last decades and concludes that contracts are "in many cases efficient means of responding to conditions that give rise to internalisation. Increasingly, these are incomplete contracts, generally taking the form of strategic alliances. This appears to be a harbinger of future organisational form in the [food] sector" (p.134).

⁵⁵ However, MARKUSEN (1995, p.171) argues that there is little empirical support for the idea that tax avoidance is an important motive for FDI: "Apparently, most companies choose foreign production locations, and then instruct their tax departments to minimise taxes".

competitiveness of all MNEs activities, and not just those in the foreign country. Very often, however, the motives for an actual FDI decision may overlap, as they are not completely independent of each other. That is, operating in a new market will also bring some access to new resources and at the same time may increase the total efficiency of a MNE.

General empirical findings on FDI suggest (see MARKUSEN 1995, pp.170-172, and the studies cited there), that, among others, (1) FDI has been growing strongly over the last decades and that most of it is horizontal direct investment among countries with similar per capita incomes, similar relative factor endowments, and relatively low trade barriers. (2) There are large differences across individual industries in the degree to which production and sales are accounted by MNEs. (3) FDI seems to be most important in companies with (i) high level of R&D relative to sales, (ii) a large share of professional and technical worker in their workforces, (iii) products are new and/or technologically complex, and (iv) high levels of product differentiation and advertising. (4) Multinationals tend to be companies in which the value of the company's intangible assets, i.e. market value minus the value of tangible assets such as plant and equipment, are large. (5) there is some evidence that plant-level scale economies negatively affect FDI. (6) MNE are usually large corporations and corporate age is important, i.e. the older the company the more likely that FDI exists. (7) Trade barriers and transport costs can cause a substitution effect toward FDI, although they may also reduce the level of both investment and trade. To sum up, the strongly growing FDI is mostly found in companies with important "knowledge capital", i.e. intangible, company-specific assets, and the share of FDI in total sales, as compared to exports, may rise as tariffs and transport costs increase.

Recent empirical findings specific to the food industries seem to confirm the general results and offer further interesting details concerning the determinates of FDI in the food manufacturing sector. GOPINATH *et al.* (1999) analysed data on foreign activities (exports and foreign sales) of the US processed food industry in 10 developed countries for the period of 1982-94, using regression analysis, and found that exports and FDI were indeed substitutes during the examined period. Their study confirmed also, that a level of per capita GDP equal to the US — as a measure of development level — was a significant factor of FDI and exports. Furthermore, the results showed that FDI was "protection-jumping" (p.450), as it was positively connected to the producer subsidy equivalent (PDS), used as a measure for protection in the food sector of the host country (exports were found to be negatively related to this variable). However, the net effect of protection was found to be small. HENDERSON *et al.* (1996b) examined the effects of market structure on 628 companies with food and/or beverage manufacturing operations, representing 41 countries, for the years 1987-90. In particular, the researchers were interested in how home market dominance (measured as a company's home market share, its size, or its price-cost margin), the specialisation into the food sector (measured by the share of food/beverage sales in total sales), and product diversity (specified as the number of 3-digit SICs within which a company produces a food or beverage product) affected exports or FDI. Their regression estimates revealed that (i) a company's dominance in its home market (as measured by its home market share) was negatively related to exports but positively to FDI. (ii) When company size was used as a measure for home market dominance, it turned out that smaller companies engaged more in exports and larger companies more in FDI. (iii) Specialisation of a multi-sector company into food/beverage products directly enhanced exports but showed no significant impact on FDI. (iv) Product diversity or differentiation discouraged exports but encouraged FDI. By examining also how the choice between exports and FDI affected the profitability of the companies, the study found some weak

evidence that FDI increased profits, while exports decreased them. This finding led the researchers to the conclusion that FDI "is a strategic behaviour in the sense that it is profit-enhancing, and ... the dominance of FDI relative to exports as an international market strategy for these companies corresponds with relative profit opportunities" (p.212). NING & REED (1995) investigated locational determinants at the aggregate market level of US food processors' FDI in six industrialised countries from 1983-89. Their regression results show that cultural links (i.e. being an English-speaking country) and the membership in a trade bloc (the EU) were major incentives for US FDI, followed by a strong foreign country currency, fast foreign market growth, and low taxes. The same researchers (REED & NING 1996) also investigated at the individual company level, how a company's technological position and its marketing skills affect FDI. In using a sample of 34 US food processing companies with data from the early 1990s the regression results reveal that high marketing expenditures, a capital intensive production, and high degrees of product diversity increased FDI, while high levels of R&D seemed to reduce FDI. This last result stands in contrast to the general findings for direct investment (see above), however the researchers acknowledge that the sample is small and biased against larger companies. REED (1996) also investigated the impact of the FDI advantage of gaining better information about consumers when being close to them with a foreign subsidiary, the significance of superior management skills, and the effect of economies of scale in production. By using a bootstrapping resampling mechanism of 100 quarterly observations (1978-92) in four US food manufacturing industries, the empirical results show that locating companies closer to target markets indeed provided better consumer data and influenced FDI decisions positively. Economies of scale were important, too, but superior management skills turned out to be less significant. ANASTASSOPOULOS & TRAILL (1998), finally, investigated determinants of foreign entry strategies in Greek food industries. In a Tobit model for eight subsectors over six years (1987-92) the following independent variables were used: marketing and R&D intensity as measures for ownership advantages, distribution intensity (distribution expenses as a proportion of sales) as a measure for a location advantage, and "legal intensity" (calculated as a percentage of legal expenses in sector sales) as an internalisation factor. As dependent variable two measures were used: first, the subsidiary sales share (i.e. the proportion of Greek domestic sales accounted for by foreign-owned companies), and the licensed sales share (i.e. the share of licensed sales in total domestic sales). The regression results show that marketing and legal expenses contributed positively and were statistically significant (at the 5% level) to subsidiary sales, but R&D expenditures were found, although with a positive sign, to be an insignificant factor. The distribution intensity variable was estimated with a negative sign and was statistically significant, indicating that higher distribution costs acted as an entry barrier to MNEs in Greece.

Conclusions that can be drawn from the empirical findings are the following: (1) FDI clearly seems to be an option mostly for large companies, i.e. size matters. As we know that in the food industries, apart from a few "global players" with world-known brands, most companies are rather small or medium-sized (see Section 2.4.1), it still needs to be shown convincingly that FDI is a real alternative to exports for most food businesses. (2) The result that R&D levels seem to be unimportant as a determinant for FDI in the food industries may be explained by the fact that food processing in general is "low-tech" (TRAILL 1997, p.401), as compared to other industries. There might be some exceptions, such as artificial sweeteners or other "high-tech foods", but for the vast majority of products this finding is true. Consequently, R&D expenditures cannot be a significant factor influencing FDI decisions. (3) Marketing efforts seem to be important, on the other hand. As food products are among the most highly advertised consumer goods, it

seems only logical that companies try to spread their existing marketing costs for brand building and brand communication over as many countries as possible. There might be an economies of scale effect as well, as the process of building a brand may be seen as a high fixed cost, and where the result then can, with some few regional adaptations, be easily transferred to other countries. Together with the need to deliver product quality as advertised, and with a minimum and stable foreign market size, FDI may then be the more profitable option. This may help to explain the fact, as to why there are a few very profitable multinational food companies that have grown enormously during the last decades and which mostly engage in FDI. However, in order to be able to do so, the food product must be one that is globally acceptable by consumers, too. As already argued in Section 2.1, these products are very often especially designed, industrially produced and highly branded products, such as confectionery, soft or alcoholic drinks, instant coffee, breakfast cereals, etc. (4) The substitution relationship between FDI and exports which was found in the cited studies may not be as predetermined as the results might suggest. Although at the market level the majority of transactions may indeed have been of substitutive character, the result only reflects an overall average. For an individual company one might expect *a priori* that all options are possible, or as TRAILL (1997, pp.397-98) put it:

Suppose a firm decides that a market which had previously been supplied by exports, had reached sufficient size that it could be supplied more cheaply by foreign production. Perhaps non-tariff barriers and transport costs were high, economies of scale unimportant — a typical food example. In this case, exports and foreign production are substitutes. Suppose and MNE buys a company in another country simply because it thinks it can make a good profit, based on its ownership advantages. Exports from its home country are unaffected — trade and FDI are independent. This is a typical multi-domestic pattern for foreign participation that has historically typified the food industry. Suppose a firm with market-seeking motives buys a company in a foreign country to gain access to distribution channels for its products. This can lead to an increase in exports from the home country — exports and FDI are positively related. Finally, consider a firm with efficiency-seeking motives that rationalises production by moving to a centre which supplies a region that includes the home country. Then, foreign production not only lowers exports (to zero), it results in imports.

Therefore, although the question of substitution or complementarity of FDI and exports has clearly policy implications, as labour markets and government tax incomes may be affected, it is less important from a company or market competitiveness point of view. Depending on the individual company, the industry and the situation in both, the home and the target country, both strategies can result in profitable outcomes. A competitive firm will always take the most profitable option and will adapt to changing market conditions.

Restrictions on the mobility of food manufacturing companies, however, may be seen in government legislation which, in Europe at least, regulate the geographical area in which certain food products *must* be produced. In order to control the location of production, special labels, so-called 'Protected Denomination of Origin' (PDO) and 'Protected Geographical Indication' (PGI) are issued (CANALI 1996, p.321). There are labels for cheese, wine, meat products, bakery goods, olive oil, and some other foods. Traditionally used in Mediterranean countries, such as France, Italy and Spain their significance has grown over the years. Thus, for example, it has been estimated that in 1992 approximately half (54%) of the Italian national cheese production was labelled with a denomination of origin sign (*ibid.*, p.319). For the wine sector the significance is even higher.⁵⁶ The idea that stands behind these labels is that, in contrast to

⁵⁶ Originally, in France, the denomination of origin label was issued as a simple sign of reconnaissance and for the identification of a singularity and not as a quality label. Today, however, it is mostly seen as the latter: a certified and publicly controlled certificate of a certain quality standard (RUFFIEUX & VALCESCHINI 1996, p.142; CANALI 1996, p.321). In Italy, national legislation to regulate denominations of origin was already passed in 1954 (CANALI 1996, p.320), and in France the origin of this idea may be seen in the first legal classification of Bordeaux wine, which took place as early as 1855 (RUFFIEUX & VALCESCHINI 1996, p.134). In Italy, the labels have traditionally been issued, and

conventional Anglo-American economic thinking, it is not believed in the countries which use these labels that a free market and strong competition will guarantee the existence of manufacturers of food products which are considered to belong to and to represent local traditions and culture. Therefore, these governments feel the need to grant special protection to those primarily small and traditional producers, in order to maintain what is felt to be part of national identity. Thus, a PDO or PGI label can be seen as a publicly transferred and controlled brand name which allows these producers to compete with the private brands of large and heavily advertising food companies (YON & BERNAUD 1993, p.120; RUFFIEUX & VALCESCHINI 1996, p.137, 140; CANALI 1996, p.322). Problems that are seen with this label system are, that the rigid legislation which regulates in detail the production process may stop producers from innovating (CANALI 1996, p.323), and that such labels in fact transfer a competitiveness advantage to selected producers (RUFFIEUX & VALCESCHINI 1996, p.140) which — from an economic point of view — does not necessarily seem to be justified, especially when these manufacturers do not produce efficiently and thus may waste valuable resources. However, even if these concepts may seem like being a typical European affair, in the USA similar strategies have been used in food marketing. CENTNER *et al.* (1989), e.g. report that many US commodity commissions and state departments of agriculture have tried to promote the use of labelling and certification marks to increase the sale of locally grown and processed food products. Some examples are "Tennessee Certified", "Grown in NY State", and "A Taste of Iowa". Moreover, in the USA, but also in Australian and New Zealand, food products are, among other goods, subject to what is known as *consumer nationalism*, i.e. the patriotic willingness to purchase a domestic product (SKAGGS *et al.* 1996). "Australian made and owned" can be found on many Australian food products, and "Buy American" has been a favourite slogan in numerous consumer campaigns in the US.⁵⁷ Thus, the location of food processing does matter, at least for marketing purposes. This leads to the conclusion that food manufacturing companies, at least the smaller ones, are not as "footloose" in their production location decisions as one might think. Producers of local foods therefore may wish or are even encouraged by law to produce in the region. Only the producers of culturally-unbound and non-traditional products, such as the already mentioned industrially produced food items may really be globally mobile, and thus can engage in FDI. In short, Coca-Cola or Kraft cheese slices can be produced all over the world, but Bordeaux wine and (real Italian) Parmesan cheese can only be manufactured in a limited area at France's Atlantic coast and in

their proper use controlled, by specific producer associations ("Consorti di tutela") (CANALI 1996, p.320), whereas in France these labels are administrated by a government institution (INAO — "Institut National des Applications d'Origine") (RUFFIEUX & VALCESCHINI 1996, p.142). In 1992, the concept was taken over into EU legislation (No. 2081/92) under the title "Protection of Geographical Indications and Designations of Origin for Agricultural Products and Foodstuffs" (CANALI 1996, p.320; RUFFIEUX & VALCESCHINI 1996, p.144).

⁵⁷ In general, having information about the region or the country of origin has been shown to be important for food consumers (see SKAGGS *et al.* 1996 and the 12 empirical studies cited there). The most important reason that stands behind this fact is that consumers see in the origin information a means of simplifying the processing of the growing information that is connected with the increasing supplies of food items from all over the world (*ibid.*, p.595). With certain country stereotypes (positive as well as negative ones) in their minds, the origin information of a food allows consumers to quickly find out if they may like a food product or not. In fact, there are two theories, that try to explain this consumer behaviour (see *ibid.*, p.594): (1) In the *halo model* country images affect beliefs about product quality when consumers are unfamiliar with products from a particular country, much like price or brand image can be used to infer something about an unknown product. The structural relationship is from country image to beliefs about product attributes to brand attributes. For example, if a consumer had never tried food products imported from China but had an image of China as a country that uses prison labour to produce exports, it may cause the consumer to question the business ethics and ingredients used to produce food products there. (2) The *summary construct model* operates such that consumers infer product information directly from country image instead of indirectly through product attributes ratings. Thus, the structural relationship is from beliefs to country image to brand attitudes. For example, consumers may infer from their knowledge of a particular Swiss cheese that all Swiss food products are high quality, thereby supplying all Swiss food exporters a positive externality of the image achieved by cheese manufacturers. To sum up, having origin information may for many consumers be as important as having information on price or brand image.

northern Italy respectively. Therefore, these restrictions on the decisions about where to locate food processing plants need to be considered too when FDI in the food industries is discussed. This point then may also be a reason why, in the food industries, large companies are rather *multi-domestic* than multinational companies, i.e. instead of producing the same product in different countries, large food manufacturing companies typically own an international portfolio of nationally produced (and only locally important) food brands, as TRAILL (1997) and RAMA (1998) claim.

In summary, FDI has been shown to have grown strongly over the last decades, and mostly in its horizontal form, i.e. complete products are produced and sold in the foreign country. FDI can be seen as being part of the process to allocate existing global capital stocks efficiently among countries, i.e. in a way that the marginal returns on investments equalise in each country. The location of food processing companies can generally be seen as resulting from a decision on the choice between producing near input markets, i.e. in the countryside near agricultural production, or rather near to output markets, i.e. near the cities and close to consumers. This trade-off problem is part of a wider discussion about where production in general is most efficient, with the general rule being, that considering transport costs for inputs as for final products and economies of scale and scope, production should take place where unit costs for the whole production and marketing process are minimised for an individual company or an entire industry. FDI decisions may follow this economic reasoning, but for an individual company other criteria, such as communication costs, costs of stationing personnel abroad, barriers due to language, customs, taxation, and protection of intellectual capital may also matter. DUNNING's (1988) OLI framework argues that for an individual company there must be organisational, locational and internalisational advantages, the sum of which must outweigh the additional costs and risks of setting up a production or marketing facility in a foreign country. Empirical findings have shown that these advantages are highest in companies with important "knowledge capital", i.e. intangible, company-specific assets, such as high R&D inputs, special brand reputation and important marketing budgets. In the food industries it has been found that R&D seems to be unimportant as a determinant for FDI decisions, but marketing expenses do matter, as does company size, i.e. large corporations are more likely to invest directly. Most of food business are, however, small or medium-sized. With regard to the question of whether FDI is a substitute or a complement for exports, the findings do rather suggest the former. However, for an individual company both strategies can be profitable options, depending on the circumstances. Finally, in reality, food manufacturers may not be as "footloose" as other industries. In Europe (and above all in Mediterranean countries) — and for a number of traditional food products — legislation exists that regulates the location where food manufacturing must take place. Special labels, such as Protected Denomination of Origin or Protected Geographical Indication have been put into place for this purpose. In Anglo-American countries, on the contrary, consumer nationalism, i.e. the patriotic willingness to purchase a domestic product, is an important issue in food purchasing decisions, which encourages food manufacturers to produce in their own country. These restrictions need to be considered when FDI in the food industries is discussed. These restrictions may also be a reason as to why, in the food industries, large manufacturers are often multi-domestic rather than multinational, i.e. they own an international portfolio of mostly nationally important brands. It seems therefore, that FDI may only be a real option for large food manufacturers of industrially produced and culturally-unbound food products. For the majority of locally operating, small and medium-sized food businesses, exports seem to be the first and maybe only choice of doing business in foreign markets.

2.3.4 Summary and conclusions

This chapter reviewed existing theories of international trade and foreign direct investment, and discussed recent empirical findings on international activities in the food industries. Focus has been put on why international trade of food products is beneficial, and why trade and FDI occur. Traditional trade theory, the new (strategic) trade theory of intra-industry trade, and economic approaches explaining FDI have been presented, complemented with PORTER's (1990/98) framework of national competitive advantage. Furthermore, since all these theories seem only partially applicable to food products, an attempt has been made to investigate theoretically and empirically the role of foreign demand and the contribution of international migration and tourism to trade in food products. The following points may summarise the findings and conclusions of this sub-section.

Benefits from international trade in food products that arise are — apart from the general gains from trade such as increases in consumption possibilities and in production efficiency due to specialisation — also specific to this particular market. These special benefits, however, may be largest for consumers who gain through a greater variety of available food products and, very often, through cheaper prices. For producers, welfare gains from trade liberalisation are not guaranteed. On the one hand they can gain access to foreign markets, but on the other hand, there is also the risk that producers may lose domestic customers to foreign competitors. This is especially true in the food product markets of industrialised economies where food consumption has become mostly income inelastic. Markets are saturated because consumers are not hungry anymore and thus, with stagnating population growth, total demand for calories has stopped to increase. As a consequence, for every foreign food product that comes on a domestic market, a local product may not be sold. Thus, inefficient producers may be driven out of the market as a result of increased competition due to international trade. Finally, society as a whole may gain when peoples move closer together as a result of international trade in food products, which, very often, may be seen as culturally-bound goods. With each foreign food product that domestic consumers start to appreciate (e.g. Italian pasta or French wine), mutual understanding may grow and thus risk of conflict might be reduced.

Traditional trade theory is mainly preoccupied with production side determinants of international trade and examines how economies actually *should* trade in order to render the global economy efficient. However, it is also the most developed theoretical framework which is in particular useful for analysing issues of trade policy and welfare implications of international trade. Traditional trade theory is based on the assumption that countries are *different* in production technology (Ricardo case), or in factor endowments such as human, physical and financial resources, and the opportunity cost of using these factors to produce (and to market) several goods (Heckscher-Ohlin case). These differences then give rise to *comparative advantages* in production which are seen as *the* cause of why goods are exported (or at least why they should be exported). In particular, the Heckscher-Ohlin theorem states that a country will export the commodity the production of which uses the factor intensively with which a nation is relatively abundantly endowed. One might argue that food processing or manufacturing, as opposed to agricultural production which is dependent on arable land resources and on suitable climate, is a comparatively basic industrial activity which does not in any case depend on a country's resources (take the production of chocolate as an example) and therefore in which it is difficult to imagine that a single country could develop a strong

comparative production advantage. This is even more so, since food manufacturing is (1) a necessary human activity which in general has always been located near where people work and live, and (2) it is also a culturally influenced activity, i.e. the way food products are produced and distributed can be important for local people. That is, very often not only production efficiency counts but also local traditions and cultural aspects of food manufacturing. Therefore, it should be clear that standard trade theory may not be able to provide a complete understanding of what actually happens in international food product markets. However, this theory may be helpful to understand trade in non-differentiated raw products such as *agricultural commodities*. In addition, the theory may also be appropriate when applied to the existing inter-industry kind of trade in high-value foods such as — typically unbranded — fresh fruit and vegetable, fresh meat and fish or oils and fats. Furthermore, comparative cost advantage in production may be important for intermediate products which are used as inputs for further processing/manufacturing in the food industries and where price may be the most important purchasing factor. For the trade of highly differentiated consumer food products, however, "world market prices" may not be the major determinant, as non-price factors such as quality aspects, brand image, pre- and after sales customer service, etc., have become more and more important. Here another approach is needed to explain existing trade pattern, in particular since traditional trade theory cannot explain intra-industry trade, but which accounts nowadays for the largest part in industrialised countries' food product trade.

New trade theory has been developed to explain the phenomena of *intra-industry trade*, or the simultaneous exchange of similar goods between countries, which can theoretically and empirically be shown as occurring mostly between industrialised nations that are *similar* in their income levels and their factor endowments. The driving forces behind this kind of trade are seen in (1) economies of scale in production which allow to minimise per unit production cost by expanding into foreign markets, and (2) product differentiation, as it is assumed that consumers in general gain utility from higher levels of product variety. For aggregated global food industries it has been shown empirically that in particular similar per capita income levels and short transport ways, together with the integration into a free trade area or a common free market promote intra-industry trade, with the last factor confirming that international food product trade is mostly of intra-regional character. At the level of individual food industries, however, these few common factors are not enough to explain the causes for intra-industry trade. Here it has been empirically demonstrated that industry-specific and related factors are necessary to gain a better understanding of what determines intra-industry trade in food products. For example, the extent of EU intra-industry trade in dairy products is influenced by producer and retailer concentration, economies of scales in production and the availability of raw milk. In general, however, intra-industry trade may also be very much a statistical phenomenon with the extent of this kind of trade increasing the more aggregated the analysed trade flows are, and with seasonal effects (harvesting times) causing biases. Thus, even though the concept of intra-industry trade is a very useful one that expands the understanding of international trade considerably, it must also — especially in the food industries — be taken with some caution. This is even the more so, as between similar countries the level and pattern of intra-food industry trade can differ considerably and one would like to know what driving forces stand behind this.

National competitive advantages were stressed by PORTER (1990/98), who argued that factors of production in today's internationally integrated economies are increasingly mobile, i.e. in case of a lack they can be acquired from the world market. That is, he sees factor endowments not as "God-given" and unchangeable but as *manageable* in the sense that they are only one input-variable among others, which are important in order to gain international competitiveness, defined as profitability of industries operating in international markets. Moreover, there are "factor creation mechanisms" especially for the development and application of knowledge and intellectual skills which PORTER sees as the real crucial input factors in modern manufacturing industries. Empirical findings underline the importance of human capital even in the in general relatively "low-tech" food industries. The second argument which PORTER put forward is that in international markets, individual companies compete rather than nations. Thus, although a country may have a comparative advantage in the production of a certain commodity, we know that in reality within the same industry there are in general competitive companies and non-competitive ones. That is, comparative advantage in production resulting from relative factor endowments does not necessarily lead to competitive advantages for every company. There is a whole set of conditions that must be fulfilled in order to gain success in international markets, such as factor and demand conditions, company strategy and market structure, supporting industries, and government and chance. Thus, national export performance must be seen as a multidimensional concept with *all* determinants being important, and not only factor endowments or technical features of production such as economies of scale. Criticism of PORTER's theory may be related to the whole concept of competitiveness. It is a term under which different people understand different things, i.e. the term is not defined exactly or in a widely accepted way. In particular PORTER's approach to define competitiveness in relationship with export performance seems not to be free of problems. There may be industries that are perfectly competitive in terms of profits, market shares and employment levels in their home markets but which simply do not engage in foreign business activity. Furthermore, for some industries it may be easier to enter foreign markets than for others. Food products may belong to the latter group, as these goods are often difficult to transport and as very often they may be culturally-bound products made for local preferences and consumption habits. Finally, it seems that the whole theory applies best to the Anglo-American way of doing business, i.e. within large companies that are listed on stock markets and managed by highly trained professionals. We know however, that, apart from a few well-known global players, food manufacturers are typically small or medium-sized. Very often they may be family owned and typically run by the owner who has "hands on" in the production process and who's company operates mostly in local markets. Therefore, PORTER's strategic management theory for globally operating industries may only be partly applicable to the large numbers of locally orientated and small-scale food businesses.

The role of foreign demand and the contribution of international migration and tourism to international trade in food products, as two factors which potentially influence the (trans-) formation of tastes in a country, was theoretically and empirically analysed. Although traditional trade theory has generally focused more on supply side explanations for the causes of international trade, demand side conditions may be more important for the strongly growing international trade in — often culturally-bound — food products. If it is assumed that tastes of (at least some) immigrants are biased versus their source countries' food products and that travellers to foreign countries may (at least in some cases) develop a taste for the food products of their favourite holiday destinations, then there should be a positive connection between international migration and tourism activities and international trade flows of (at least some) food

products. For immigration, there are, in theory, two effects on food product imports from the source countries of the migrants: (1) With rising immigrant levels in a country (which are assumed to lead to an increase in total population), the total demand for food will rise — and given the assumed bias in the tastes of the immigrants versus their source countries' food products — the share of imported food products in totally consumed food will rise, too. (2) More immigrants in an economy may also lead to an increase of e.g. ethnic restaurants, speciality shops, stalls on local food produce markets, ethnic cuisine product lines in supermarket shelves. The food products supplied via these new channels are likely to be also consumed (at least to some extent) by the local (home) population. As the total amount of food consumed in today's affluent societies may be seen as fixed, these new ethnic food products will therefore substitute locally produced food. As a consequence, the share of imported food products in totally consumed food rises, too. Thus, immigrant groups may be seen as catalysts for the change in tastes in the home population. Increased international tourism activities may be seen as another factor that may alter the existing tastes of the home population. Here, international travel may lead to more contact with new and exotic food products. If it is assumed that at least some of the tourists wish to consume — back in their home countries — (at least some of) the products that they have experienced in their favourite holiday destinations, then similarly to the second effect of migration above, there may be a positive connection between rising levels of international tourism and rising shares of foreign food products (i.e. rising levels of imports) in the total consumption of food products. These theoretical hypotheses have been tested empirically for the case of Germany during the period from 1967-90. In order to control for trends that are commonly present in time series data and thus to avoid the problem of spurious correlation, an error-correction model approach has been used. The empirical results are, as so often in this kind of research, not indisputable. However, for German aggregate food imports from India, Thailand, China, and Turkey, and for imports of wine, cheese, and processed/preserved vegetables from France and Italy, it may be concluded that migration to Germany and international travel activities of Germans to these destinations have indeed contributed to rising food product imports from these countries. The tourism elasticities for individual food products have been found to lie between one and two, and — consistent with a priori expectations — they are below unity for aggregate food imports from the analysed Asian countries. As expected, the estimates of the immigration elasticities were found to be higher than those for international tourism activities. In some cases, as for imports of drink wine from France, and of cheese and processing wine from Italy, they have been estimated as being well above two. These findings may thus complement the other theories of international trade in food products presented here. Perhaps these demand side effects may describe better the driving forces that stand behind the rising levels of international trade in food products, at least for those culturally-bound ones, which are mostly produced by small and medium-sized food manufacturers.

Foreign direct investment (FDI) has been shown to have grown strongly during the last decades, and mostly in its horizontal form, i.e. complete products are produced and sold in foreign countries. FDI can be seen as being part of the process to allocate existing global capital stocks efficiently among countries, i.e. in a way that the marginal returns on investments equalise in each country. The location of food processing companies can generally be seen as resulting from a decision between producing near input markets, i.e. in the countryside near agricultural production, or near to output markets, i.e. near the cities and close to consumers. This trade-off problem is part of a wider discussion about where production in general is most efficient, with the general rule being that considering transport costs for inputs and for final products and economies of scale and scope, production should take place where

unit costs for the whole production and marketing process are minimised for a individual company or a whole industry. FDI decisions consider this economic reasoning, but for an individual company other aspects such as communication costs, costs of stationing personnel abroad, barriers due to language, customs, taxation and protection of intellectual capital may also matter. DUNNING's (1988) OLI framework argues that for an individual company there must be organisational, locational and internalisational advantages the sum of which must outweigh the additional costs and risks of setting up of a production or marketing facility in a foreign country. Empirical findings have shown that these advantages are highest in companies with important "knowledge capital", i.e. intangible, company-specific assets, such as high R&D inputs, special brand reputation, and important marketing budgets. In the food industries it has been found that R&D seems to be less important as a determinant for FDI decisions, but marketing expenses do matter, as does company size, i.e. large corporations are more likely to invest directly. Most food businesses are however small or medium-sized. Concerning the question, whether FDI is a substitute or a complement for exports, the findings do rather suggest the former. However, for an individual company both strategies can be profitable options, depending on the circumstances. Finally, in reality food manufacturers may not be as "footloose" as other industries. In Europe (above all in the large Mediterranean countries), and for a number of traditional food products, legislation exists that regulates the location where food manufacturing must take place. Special labels, such as "Protected Denomination of Origin" and "Protected Geographical Indication" have been put into place for this purpose. In Anglo-American countries, in the contrary, consumer nationalism — i.e. the patriotic willingness to purchase a domestic product — are a big issue in food purchasing decisions, and which encourage food manufacturers to produce in the own country. These restrictions need to be considered when FDI in the food industries is discussed. It seems therefore that FDI may only be a real option for large food manufacturers of industrially produced and culturally-unbound food products. For the majority of locally operating, small and medium-sized food businesses, exports seems to be the first and maybe only choice for doing business in foreign markets.

In conclusion, it needs to be stressed that: (1) it is important to understand the general idea of international trade, which is that global production should be organised in a way in which it is most efficient, and where trade is a necessary component for the distribution of the so-produced goods. That is, wheat growing should take place where it is most cost effective, and so should timber cutting, or steel production. Nations would then specialise and exchange goods among each other, rather than each country starting to produce all goods by itself. However, many modern industrial activities, such as car making or TV set production can in fact be done in many countries, as material inputs can be required from world markets and labour is available everywhere, even though wage rates may differ. However, in today's affluent societies, where available income generally does not restrict the existence of tastes and preferences, prices (i.e. production costs) may not be the decisive factor anymore. There are enough people who can afford a Mercedes, and many may prefer a stylish home stereo colour TV with remote control to a black and white set, even if the former may be triple the price or more. Consumers have gained more choice through international trade, and — as more variety seems to be welfare-enhancing by itself — trade can thus be composed of a whole spectrum from low cost to high quality suppliers. Therefore, international trade has changed from its one-way form to the two-way exchange of similar goods. However, the fact that in today's international markets many determinants matter, does not mean that today's production is necessary inefficient. On the contrary, companies try to gain comparative production advantage for example through exploiting economies of scale and scope. Where transport costs exceed these gains, a foreign subsidiary

may be set up. In contrast to immobile nations, individual companies have many options to serve foreign markets, and thus to become or to stay competitive. The economic (and export) performance of a nation is, after all, only the sum of its companies' achievements. Similar companies may be aggregated into individual industries, but it should have become clear that international trade needs to be discussed at the company and industry level and not at a country level, as company and industry specific factors almost always influence the extent and pattern of trade. Therefore, the next section, in comparing the food industries intersectorally and internationally, will discuss the economic structure, i.e. production and marketing determinants, together with other factors that may influence international trade in food products.

(2) Trade in modern consumer food products seems to fit uncomfortably in the context of production-based, traditional trade theory. As most consumers may not eat *wheat* but Italian pasta, Chinese noodles, French bread, Danish pastry, or German wheat beer, the price of wheat may even be unimportant. Clearly, food producers will always look for cheap inputs, in order to maximise their profits, thus favouring low-cost suppliers. Therefore, traditional thinking is important in industrial input markets, and food processing/manufacturing is dependent on material inputs. However, consumers may want a particular brand, or a special quality, they may be concerned about how a food product is produced, or where it comes from, and many consumers may be willing to pay a premium for these features and thus accept a product price that is higher than a low-cost alternative. That is, international trade in final consumer products can be seen as much more complex than the comparative production advantage approach which may determine input markets. Thus, due to the importance of non-price factors, foreign markets may be seen now as increasingly open for producers who can deliver a special quality (e.g. Black Angus beef), a better service (e.g. customer information phone line) or a fancy brand image (e.g. Mexican beer). Therefore, the focus on trade-determining factors, at least for food products, may have shifted from production factors to consumption determinants. Perhaps a point that international economists may still have to learn from export marketing specialists. In order to explore these consumption-based forces more deeply, the next section will also explore the mechanics of modern international food consumption and its contribution to international trade in consumer food products.

2.4 The economic structure of the international food industry and food consumption in the 21st century

This section explores the determinants of international trade in food and drink products on the production and the consumption side. First, the production structure of food industries in different western countries at the turn of the millennium will be discussed and it will be argued that food and drink processing/manufacturing is particular in many ways in comparison to other industrial manufacturing activities. As a consequence, food and drink industries may be structurally much less suited to international marketing activities than other non-food industries. Second, modern international food consumption will be explored, and a dynamic food consumption model, specified as a utility accumulation approach, will be presented. As it becomes clear, the desire of modern consumers for a multi-dimensionally optimised diet drives international food consumption convergence tendencies. But as in fact different products may be suitable for optimising ever more internationally similar objective functions, regionally different food consumption patterns will still exist in the future.

2.4.1 *The economic structure of the international food industry*

A worldwide comparison of the economic structure of food and drink processing/manufacturing is important for the analysis of underlying forces that determine success in international food markets. As many of the theories trying to explain international trade make specific assumptions on sector and industry characteristics (as e.g. input dependence, cost structure, economies of scale, size of companies, specific trade and investment barriers, etc.) a review of relevant facts is presented in the following.

The food processing industry is part of the traditional — secondary — manufacturing sector. A good description of industrialised countries' food and beverage processing/manufacturing activities is provided by KOHLS & UHL (1998, p.85):

The food processing industry today can be divided into two sectors: (1) a dominant core that consists of a few very large companies producing well-known brands and accounting for a significant share of industry sales, and (2) a competitive fringe that consists of a large number of smaller companies producing less well-known brands accounting for a small share of industry sales.

The following pages will illustrate and expand this characterisation. Data will be provided for the EU and US food and drink sector, and more detailed information will be given for German and Australian food and drink processing/manufacturing industries. Also, financial data on the world's 50 largest food and drink corporations will be presented, and the significance of trade barriers in international food and drink markets will be discussed.

2.4.1.1 Size and significance of food manufacturing in the economy

The European food, drink and tobacco sector employed slightly more than 3.7 million people in 1996, i.e. a little more than 3% of the total EU-15 workforce (EUROSTAT 2001, p.33). Turnover of this sector accounted for more than 4% of the total business turnover in the European Union (*ibid.*). Food manufacturing activities dominate this sector, with the tobacco industry accounting for between 7% and 8% of total production and the beverage industry accounting for about 15% of total production (EUROSTAT 2000, p.103). As food sub-sectors, other food products accounted for 22% of the total food, drink and tobacco production value, production, processing and preserving of meat and meat products 18%, and the manufacture of dairy products 15% (*ibid.*). The share of the food, drink and tobacco sector in total EU manufacturing activities was 16.2% in 1996, as measured in production value, but only 11.4% in terms of value-added (*ibid.*). Table 24 gives an overview of EU-15 food, drink and tobacco manufacturing and of its member countries. These figures include all food, drink and tobacco manufacturing enterprises, i.e. also small food trades, such as bakeries, butchers, fishmongers etc. As it becomes clear, almost 60% of all EU food enterprises employ less than 250 staff and can thus be considered as small and medium sized enterprises. For the EU-15, the average number of employees per company is therefore just below 13, with only the Northern European countries United Kingdom, the Netherlands, Denmark, and Norway showing significantly higher average staff per company levels. The mean EU-15 turnover per company is about US\$2m, with the United Kingdom, Denmark and Norway having significant above average turnover per company levels. However, when turnover is calculated on a per employee basis, Belgium and Germany lead the field, surpassing the EU-15 average of US\$158 000 significantly. In all, it becomes clear that food, drink and tobacco processing/manufacturing in most of the EU countries is still a very low-scale activity, performed mainly by small and medium sized companies.

Table 24: Economic structure of EU food, drink and tobacco sector*, 1996

Country	No. of firms	Turnover (US\$m)	Total employment and size classes† (in %)						Average no. of employ. per firm	Turnover per firm (US\$m)	Turnover per employee (US\$'000)
			Total no.	0	1-9	10-49	50-249	250+			
EU-15	293 662	584 991	3 707 282	2.2	19.4	19.8	18.3	40.3	12.6	2.0	158
D	54 840	168 388	875 041	0.4	18.8	24.3	16.7	39.7	16.0	3.0	192
F	67 067	-	649 015	3.9	26.8	18.9	18.4	32.1	9.7	-	-
UK	16 081	58 895	504 188	1.9	3.5	8.5	-	-	31.4	3.7	117
I	70 005	72 255	440 220	3.3	35.3	22.6	17.4	21.4	6.3	1.0	164
E	58 298	51 376	398 195	4.0	20.7	-	21.8	-	6.8	0.9	129
NL	5 625	-	213 659	0.7	11.9	11.7	-	-	38.0	-	-
B	10 507	21 190	106 804	6.2	23.5	20.1	17.4	32.9	10.2	2.0	198
DK	2 173	16 126	92 365	0.6	-	13.1	16.4	-	42.5	7.4	175
NO	1 951	9 627	53 555	0.0	6.6	20.3	22.3	50.8	27.5	4.9	180
IS	655	-	9 037	0.9	10.5	32.9	17.4	37.2	13.8	-	-
P	11 280	-	-	0.4	19.2	28.6	-	-	-	-	-
FIN	1 925	-	-	1.2	6.4	12.8	-	-	-	-	-
S	1 864	-	-	1.1	7.4	12.7	-	-	-	-	-
A	4 678	-	-	0.6	18.5	28.2	-	-	-	-	-

Notes: *As measured by production, the tobacco industry accounted for between 7% and 8% of total production in this year, and the beverage industry accounted for almost 15% of the total.

†Average no. of employees per company in %.

Data includes *all* food/beverage enterprises in Europe, i.e. also small food trades such as bakeries, butchers, fishmongers, etc. ECU have been converted into US\$ using as exchange rate: ECU1=US\$0.7987.

Sources: EUROSTAT, *Enterprises in Europe 6th Report*, 2001, p.33; EUROSTAT, *Panorama of European Business*, 2000, p.103; Author's calculations.

US food processing industries in 1997, as compared to the European ones, can be described as larger-scale (see Table 25). Although the data in Table 24 and Table 25 are not completely comparable, as the latter does not include companies with no employees and excludes tobacco manufacturing, it is still safe to conclude that US food companies are, in general, larger than EU ones. The average number of employees per company is about 56 for the US and thus more than 4 times the EU figure. The US turnover per company at about US\$15m is 7.5 times higher, and the turnover per employee with US\$287 000 is almost twice as high as the EU-15 figure. Apart from being larger-scale, the significance of food processing in US manufacturing is smaller than in the EU as it accounts only for 11.9% of total manufacturing turnover (10.4% of value-added) as compared to 16.2% (11.4%) in the EU-15. Moreover, food and drink (including tobacco) industries were more value-adding in the US with a percentage of value-added in total production of 42.6% in 1997 as compared to 21.5% in the EU-15 (EUROSTAT 2000, p.107). The most important US food manufacturing sub-sectors in 1997 were meat product manufacturing with 27% of total food manufacturing turnover, followed by dairy product manufacturing with 14% and grain and oilseed milling with a 12% share. To sum up, US food and drink manufacturing is a larger-scale and a more value-adding activity than in the EU. As compared to each area's manufacturing sector, US food manufacturing is less important than in the EU but value-adding in both regions is smaller than in other manufacturing industries.

Table 25: Economic structure of US food processing industries, 1997

<i>Industry</i>	<i>No. of firms</i>	<i>No. of employees</i>	<i>Turnover (US\$m)</i>	<i>Aver. no. of employ. per firm</i>	<i>Turnover per firm (US\$m)</i>	<i>Turnover per employee (US\$'000)</i>	<i>Value added as % of turnover</i>
Food manufacturing	26 361	1 471 050	421 737	55.8	15.0	287	38.8
Animal food manufacturing	1 702	46 870	27 732	27.5	16.3	592	31.7
Grain & oilseed milling	894	59 338	52 076	66.4	58.3	878	30.5
Sugar & confectionery product manufact.	1 743	85 554	24 114	49.1	13.8	282	49.2
Fruit and vegetable preserving and speciality food mfg.	1 790	192 810	46 618	107.7	26.0	242	50.1
Dairy product manufacturing	1 838	133 010	58 670	72.4	31.9	441	30.0
Meat product manufacturing	3 402	463 266	112 979	136.2	33.2	244	26.7
Seafood product preparation and packaging	844	41 338	6 919	49.0	8.2	167	36.3
Bakeries & tortilla manufacturing	11 257	299 072	43 723	26.6	3.9	146	62.1
Other food manufacturing	2 891	149 792	48 905	51.8	16.9	326	53.8
All manufacturing	362 829	16 805 127	3 834 701	46.3	10.6	228	47.6
<i>Food manufacturing as % of all manufacturing</i>	<i>7.3</i>	<i>8.8</i>	<i>11.0</i>	<i>120.5</i>	<i>151.4</i>	<i>125.6</i>	<i>81.5</i>

Note: Data includes only establishments with payroll.

Sources: US Census Bureau, *Annual Survey of Manufactures*, 2001; Author's calculations.

German food processing industries' structural economic data in 1998 is provided in Table 26. The figures exclude small food trades, i.e. they reflect only *industrial* manufacturing activities of companies with more than 20 employees. Thus, the data is not directly comparable to the one of Table 24. This fact explains the relatively high employee per company ratio of 118 for total food and beverage manufacturing, ranging from 87 for fresh bakery products to 969 for ice cream production. However, even with this focus, the German food and beverage industry is still organised on a smaller-scale than the overall German manufacturing sector, employing an average number of 170 people per company. Turnover per company for the average food/drink plant of almost US\$27m was only about 77% of the total manufacturing figure. Turnover per employee was about 10% higher than the figure for total manufacturing, but value-added as percent of turnover was only about 70% of the total manufacturing value. Thus, German food and beverage manufacturing generally takes place in relatively smaller companies with smaller gross profits but higher labour productivity levels relative to the manufacturing sector. As compared to the US situation, it is striking how much lower German food and drink industry gross profits were (18% versus 39%), despite almost the same level of labour productivity. The most important German sub-sectors in 1998 were beverages with 19% of total food and beverages turnover (beer alone accounting for 8%), milk processing 16%, meat processing 10%, and confectionery 8%. Between 1995 and 1998 beverage industries generally experienced negative growth, as did coffee roasting and tea packaging, sugar, starch products and cereal foods, ice cream manufacturing and seafood processing. The industries, which grew most during that period were fresh bakery products, meat processing, and fruit and vegetables.

The Australian food processing industry's economic structure in 1998/99 (financial year) is presented in Table 27. Judging by the average employee per company ratio the Australian food and beverage industry appears similar to its US equivalent (49 people as compared to 56). However, all other structural measures are much lower and are in fact in between EU and US levels: the Australian turnover per company of about US\$9m is only 60% of the US figure (EU-15: US\$2m), the turnover per employee of US\$186 000 is 65% of the US figure (EU-15: US\$158 000), and the value-added as percent of turnover at 28.0% is just 72% of the equivalent US value. In comparing Australian food and beverage manufacturing to its national manufacturing industries' average the same structural pattern as in the USA appears: in general food processing companies are larger than the average manufacturing plant as measured by the employee per company (2.6 times larger) and the turnover per company (3.2 times larger) ratio. Also, the turnover per employee figure is accordingly higher as compared to the total manufacturing average, but the value-added is considerably lower. Once again it becomes clear that food and beverage manufacturing is an economic activity with a comparatively high level of labour productivity and a relatively low gross margin. The most important sub-sectors in the Australian food and beverage industry in 1998/99 were meat processing with a 14% share of total industry turnover, followed by other dairy products with 9%, and fruit and vegetables with 7%. That is, the Australian food and beverage industry is structurally positioned in between the small-scale, low value-adding European food and drink industry and the large-scale and high value-adding US one.

Table 26: Economic structure of the German food processing industry, 1998

	No. of firms	Δ 95-98 (%)*	Employees	Δ 95-98 (%)*	Turnover (US\$m)	Δ 95-98 (%)*	Industry value added (US\$m)	Δ 95-98 (%)*	Employees per firm	Turnover per firm (US\$m)	Turnover per employee (US\$ '000)	Val. add. as % of turnover
Meat and seafood												
Meat processing	914	8.0	83 053	3.3	12 469	3.1	2 936	19.4	91	13.6	150	23.5
Seafood processing	62	-21.5	8 648	-27.8	1 768	-17.8	323	-19.1	139	28.5	205	18.3
Dairy												
Milk processing	187	-10.1	36 228	-9.6	20 594	3.6	1 794	-3.2	194	110.1	569	8.7
Ice cream	7	-12.5	6 780	-36.5	1 481	-29.6	295	-39.5	969	211.6	218	19.9
Fruit and vegetables	213	1.9	26 692	5.2	6 691	13.8	1 115	5.7	125	31.4	251	16.7
Oil and fat	26	-10.3	7 843	-27.8	5 832	10.7	472	-19.8	302	224.3	744	8.1
Starch products and cereal food												
Starch and starch products	9	-30.8	2 692	-4.6	1 006	-3.8	173	-8.0	299	111.7	374	17.2
Pasta	29	-9.4	2 878	-36.0	594	-21.6	95	-43.9	99	20.5	206	16.0
Bakery products												
Fresh bakery products	2 003	62.7	173 620	47.4	9 686	34.9	4 495	47.8	87	4.8	56	46.4
Long shelf-life bakery products	84	-13.4	19 930	-4.6	2 841	6.7	671	-3.0	237	33.8	143	23.6
Other food												
Sugar	12	-14.3	7 470	-20.2	3 790	-0.3	539	-14.7	623	315.8	507	14.2
Confectionery	133	-5.0	33 612	-7.3	10 000	24.4	1 977	25.1	253	75.2	298	19.8
Coffee roasting, tea packaging	31	-18.4	4 603	-23.8	2 886	-39.1	419	-0.1	148	93.1	627	14.5
Spices and sauces	54	8.0	23 834	2.6	5 828	11.2	1 143	-0.1	441	107.9	245	19.6
Dietetic food	11	57.1	2 811	-5.2	813	17.9	147	-4.2	256	73.9	289	18.0
Food nec	86	2.4	15 342	1.2	3 570	18.8	879	12.4	178	41.5	233	24.6
Beverages												
Spirits	58	-31.0	5 122	-29.6	3 949	-16.5	242	-56.1	88	68.1	771	6.1
Wine	28	-17.6	2 635	-14.2	1 598	18.5	203	34.5	94	57.1	607	34.0
Beer	360	-9.8	41 062	-13.2	10 698	-4.1	2 597	-5.9	114	29.7	261	24.3
Mineral water, soft drinks	153	-11.0	27 027	2.8	7 163	-3.9	1 537	4.3	177	46.8	265	21.5
Total beverages	628	-12.8	77 308	-9.5	24 032	-5.0	4 659	-6.6	123	38.3	311	19.4
Total food and beverages	4 854	16.3	574 560	5.0	129 827	3.9	23 817	5.9	118	26.7	226	18.3
Total manufacturing industry	37 586	0.5	6 379 319	-4.4	1 313 302	11.0	344 018	7.3	170	34.9	206	26.2
<i>Share of food/beverage industry in total manufacturing industry (%)</i>	<i>12.9</i>	<i>15.8</i>	<i>9.0</i>	<i>9.8</i>	<i>9.9</i>	<i>-6.4</i>	<i>6.9</i>	<i>-1.3</i>	<i>69.7</i>	<i>76.5</i>	<i>109.8</i>	<i>70.0</i>

Notes: *Total change between 1995 and 98 in %. Data covers only firms with 20 and more employees. Monetary values converted, using as exchange rate DM1=US\$0.5683

Sources: Statistisches Bundesamt (German Bureau of Statistics), *Fachserie 4.3*, various issues; Author's calculations

Table 27: Economic structure of the Australian food processing industry, 1998/99*

	No. of firms	Employees ('000)	Turnover (US\$m)	Wages/salaries (US\$m)	Value added (US\$m)	Employees per firm	Wage/salary per employee	Turnover per firm (US\$m)	Turnover per employee	Val. add. as % of turnover
Meat	551	51	6 700	1 038	1 665	93	20 351	12.2	131 381	24.9
Meat processing	279	30	4 310	636	975	108	21 189	15.4	143 656	22.6
Poultry processing	136	13	1 509	260	427	96	20 032	11.1	116 088	28.3
Bacon, ham and small goods	136	8	881	142	263	59	17 727	6.5	110 126	29.8
Dairy	211	17	4 925	473	1 040	81	27 831	23.3	289 720	21.1
Milk and cream processing	39	6	1 756	173	374	154	28 760	45.0	292 624	21.3
Ice cream	72	3	433	70	128	42	23 218	6.0	144 325	29.6
Other dairy products	100	8	2 737	231	538	80	28 865	27.4	342 144	19.6
Fruit and vegetables	264	11	2 216	280	580	42	25 442	8.4	201 485	26.2
Oil and fat	52	2	658	53	141	38	26 669	12.6	328 810	21.5
Flour mill and cereal food	225	8	2 109	194	594	36	24 237	9.4	263 628	28.1
Flour mill products	42	2	799	65	174	48	32 316	19.0	399 404	21.8
Cereal food and baking mixes	183	6	1 311	129	420	33	21 544	7.2	218 475	32.0
Bakery products	675	23	2 140	490	865	34	21 308	3.2	93 061	40.4
Bread	58	9	821	233	298	155	25 867	14.2	91 266	36.3
Cakes and pastry products	606	9	672	161	243	15	17 849	1.1	74 673	36.2
Biscuits	11	5	647	97	323	455	19 327	58.8	129 391	50.0
Other food	941	36	6 748	856	1 842	38	23 775	7.2	187 431	27.3
Sugar	22	7	1 556	163	373	318	23 307	70.7	222 225	24.0
Confectionery	123	6	922	166	387	49	27 610	7.5	153 633	41.9
Seafood	126	4	697	63	122	32	15 688	5.5	174 288	17.6
Prepared animal and bird feed	169	4	1 599	117	326	24	29 179	9.5	399 874	20.4
Food nec	501	15	1 973	348	634	30	23 218	3.9	131 566	32.1
Beverage and malt	471	18	5 412	444	1 929	38	24 647	11.5	300 642	35.6
Soft drink, cordial and syrup	101	6	1 625	165	506	59	27 505	16.1	270 766	31.2
Beer and malt	40	3	1 580	104	560	75	34 513	39.5	526 682	35.4
Wine	312	9	2 085	168	832	29	18 686	6.7	231 687	39.9
Spirits	18	0	121	6	31	0	-	6.7	-	25.9
Total food and beverages	3 390	166	30 908	3 827	8 656	49	23 055	9.1	186 194	28.0
Total manufacturing industry	48 951	937	139 653	22 025	42 856	19	23 495	2.9	148 979	30.7
<i>Share of food/beverage industry in total manufacturing (%)</i>	<i>6.9</i>	<i>17.7</i>	<i>22.1</i>	<i>17.4</i>	<i>20.2</i>	<i>255.7</i>	<i>98.1</i>	<i>319.6</i>	<i>125.0</i>	<i>91.3</i>

Notes: *Financial year ending June 30. Monetary values converted, using as exchange rate A\$1=US\$0.6275. nec = not elsewhere classified.

Sources: ABARE (2001), *Australian Food Statistics 2001*; ABS (2001), *Manufacturing Industry, Australia*; Author's calculations.

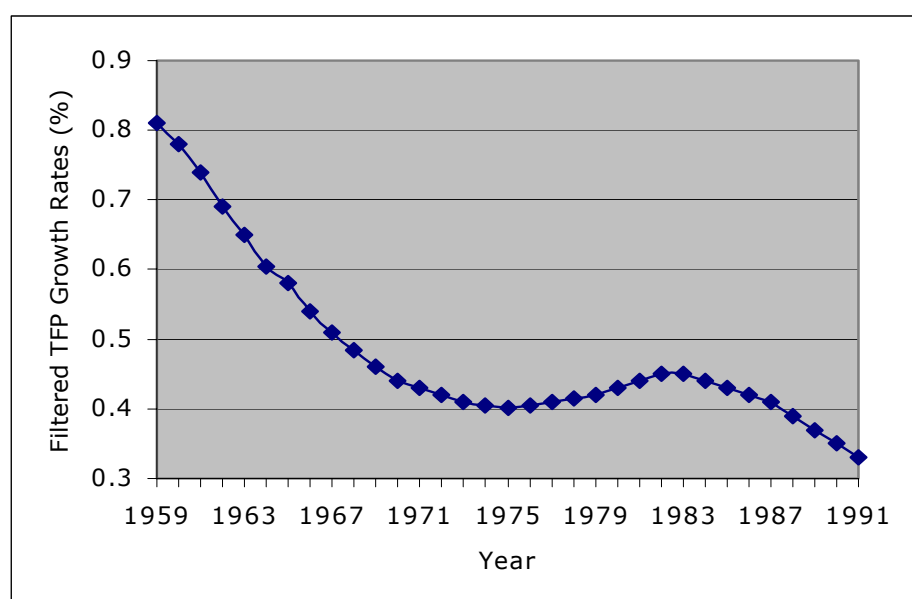
In summary, the comparison of food and beverage industries of the EU-15, the US, Germany, and Australia reveals that in Europe this economic activity takes place in comparatively small production plants and that its value-adding is considerably lower than in the US. The Australian food and beverage industries lie in between these two extremes. When food and beverage manufacturing is compared to the overall manufacturing industries' average — as measured by the employee per company and the turnover per company ratios — it becomes clear that food and beverage plants in the EU-15 are usually smaller than average manufacturing plants, but in the US they are larger than this benchmark. In all three continents turnover per employee are usually higher than the all manufacturing average, implying higher labour productivity levels. On the other hand, gross profits, i.e. the value-added, are in all three continents considerably lower in comparison to the all manufacturing figure. Although it seems that economies of scale and productivity in food and beverage processing should be investigated in more detail, it already becomes clear that this industry seems structurally to be a high-volume, low-margin one.

2.4.1.2 Productivity and economies of size

This sub-section explores the significance of total factor productivity and of economies of scale, scope and experience in the food industries. Empirical evidence from recent studies is provided in order to illustrate these aspects.

The contribution of total factor productivity (TFP), real price effects, and inputs to the real value of output of the US food processing sector were calculated by GOPINATH *et al.* (1996). The researchers used the envelope properties of a sectoral gross domestic product (GDP) function and the Quadratic Approximation Lemma of Diewert. The application of this lemma to the US food processing GDP function, using data for the period 1959-91, permitted the researchers to quantify the effects of real prices, material inputs, and TFP effects on US food processing sector's GDP growth.⁵⁸ Their results show that the major factor contributing to growth in food processing GDP (1.04% annually during the period 1959-91) were input effects, with material inputs (including among others, primary agricultural products) accounting for almost all this growth. However, a 0.83% decline in real price of sectoral output offset the contribution from other inputs to that growth. Increases in TFP were relatively low, at 0.41% per annum compared to 0.47% for the economy as a whole and 2.31% for primary agriculture (*ibid.*, p.1055). By using a Hodrick-Prescott filter for separating the calculated TFP time series from the noise of unanticipated effects (such as e.g. weather influences), the researches found a declining trend for the contribution of total factor productivity to the growth of food processing industry's output. Figure 16 illustrates the declining contribution of TFP during the period 1959-1991 and Table 28 summarises the main findings.

⁵⁸ In fact, a constant-returns-to-scale or vintage production function was maximised subject to input restrictions. The derived Lagrangian multipliers represented shadow prices for sector-specific and economy wide inputs (GOPINATH *et al.* 1996, p.1045).

Figure 16: Filtered TFP growth rates in US food processing, 1959-1991

Source: GOPINATH M., ROE T.L. & SHANE M.D. (1996), 'Competitiveness of US Food Processing: Benefits from Primary Agriculture', in *American Journal of Agricultural Economics*, 78, pp.1044-1055.

Table 28: Components of US food processing growth (%), 1959-1991

	GDP Growth	Real Price Effect*	Input Contribution**	TFP Growth
1959-91				
Average	1.04	-0.83	1.46	0.41
Std. Devn.	3.14	3.27	1.78	1.05
1959-63	1.05	-1.79	1.84	1.00
1964-68	1.61	-1.03	2.34	0.34
1969-73	3.52	1.54	1.46	0.52
1974-78	1.84	-0.51	2.64	-0.29
1979-83	-1.46	-2.27	-0.09	0.90
1984-88	0.78	-1.15	1.14	0.79
1989-91	-0.64	-0.94	0.59	-0.29

Notes: * The real price effect is the sum of the price effects from crops (-0.21%), grains (-0.14%), dairy (-0.13 %), and meat prices (-0.36%), the latest contributing most on average during the whole period.

** The input effect is aggregated from the individual effects of labour (-0.06%), capital (0.49%), energy (0.02%), and material effects (1.01%), the latest contributing most on average during the whole period to the combined input effect. For more details see source.

Source: GOPINATH M., ROE T.L. & SHANE M.D. (1996), 'Competitiveness of US Food Processing: Benefits from Primary Agriculture', in *American Journal of Agricultural Economics*, 78, pp.1044-1055.

In conclusion, it becomes clear that food and drink processing/manufacturing may be a comparatively mature economic activity, which is performed in today's industrialised countries in already almost optimal production conditions. Technical progress can therefore be seen as slow which is reflected in low TFP growth rates. However, the above findings apply only to the US economy, and as seen before, Australian and in particular EU food and drink industries are much smaller-scale and probably less industrialised than US food processing plants. Therefore there may still be more scope for technical

improvements and production productivity growth in these continents.⁵⁹ Besides, from the data presented it is still not clear whether, as compared to other sectors, food and drink processing/manufacturing is a labour intensive or rather a capital intensive industry. CONNOR & SCHICK (1997) claim that food processing is "a relatively labour-extensive manufacturing activity" (p.3) and rank the industry among the leading manufacturing industries in the amount of physical assets available per employee. This may be underlined by the above finding of greater than average turnover per employee ratios reflecting high machinery, i.e. capital use in the food and drink processing/manufacturing industry. But as before, this finding may apply mainly to the highly industrialised, large-scale US food and drink processing/manufacturing industry. Moreover, as the "food industry is far from homogenous" (TRAILL 1997, p.401), there may be large differences with respect of capital utilisation in the different sub-sectors.

Economies of scale, scope and experience (or, in short, economies of size) are concepts that need to be discussed first before the significance of these effects in the food processing/manufacturing industries can be explored. *Economies of scale* are defined as reductions in average unit costs due to increases in the scale of output (PRATTEN 1991, p.13). Another way of saying this is that economies of scale exist if total costs rise less proportionately than output (BALASUBRAMANYAM & SALISU 1994, p.63). *Economies of scope* arise when the production of two or more products reduces unit costs compared to the situation where each product is produced separately, i.e. the cost of producing a number of products jointly is less than the total cost of separate production of each of the products (PRATTEN 1991, p.15). *Economies of experience* (or learning curve effects) arise from long-term production cycles through learning, i.e. unit costs fall with cumulative output over time (*ibid.*, p.18). Whereas economies of scale occur because a company increases its output, economies of experience can be realised when a company produces at a constant output level for a long period of time. Then unit costs may fall due to increases in production efficiency through the creation of know-how. *Sources* for economies of size are indivisibilities of production factors, increased dimensions, specialisation, massed resources, more efficient organisation, learning effects, and/or vertical integration (*ibid.*).⁶⁰ *Minimum efficient size* (MES), finally, is defined as the scale of

⁵⁹ On the other hand, it is not sure whether in particular European consumers would accept the highly-industrialised US food manufacturing style, as the conflicts between the US and the EU on e.g. the use of growth hormones in meat production or the adverse positions of both continents on genetically modified foods show. Also, the worldwide emergence and growing significance of organic food as an alternative to industrially produced groceries (see LOHR 2001 for and a good overview) make it unlikely that large-scale mass produced consumer food products will be the only or main form of food supply of the future (see Section 2.4.2 for a more detailed discussion of this topic).

⁶⁰ *Indivisibilities of input factors*, such as e.g. machines which can only produce within a certain output level range, demand an optimal output level at which input factors can be used most efficiently. Investments in Research and development or certain overhead administration costs belong also into this category. As fixed costs, they rise only stepwise with output. While staying on the same level, higher output levels will result in lower unit costs, i.e. in economies of scale. *Increased dimensions* of production result usually in lower unit initial and operating costs due to inherent technical properties. For example, the material needed per volume unit of a water tank decreases as the tank's cubic capacity rises. In addition, proportionally fewer parts may be needed for its construction. In cooking, the preparation of a meal for six people takes longer than for two people, but usually it does not take 3 times as long. *Specialisation* of the labour force or of capital equipment as result of higher output levels will usually result in higher productivity and thus in economies of scale. *Massed resources* result e.g. in proportionally lower stock keeping costs or reduced production risks. For example, a food manufacturer who runs several identical processing machines needs to stock proportionally fewer spare parts than a manufacturer who uses only one machine since it is unlikely that all machines develop the same faults at the same time. Also, a company with a large customer base is less vulnerable against a sudden loss of a few customers. *A more efficient organisation* may in some cases be achieved at higher output levels. For example, in industrial baking continuous baking ovens can only be used from certain output levels on, leaving small bakers using traditional ovens with significant cost disadvantages. *Learning effects* are the main reason for economies of experience (see text above). *Vertical integration* possibilities arising from larger company sizes may involve e.g. the starting of in-company processing of inputs which may technical efficiencies to be gained. Thus, in certain cases these integration activities may result in overall lower unit costs as compared to a more specialised, small-

production at which unit costs cease to fall, which means in practice the output level at which costs cease to fall rapidly rather than the level at which they cease to fall at all (*ibid.*, p.13).

In the food and drink processing/manufacturing industries the importance of economies of size has been shown by empirical research as not being overly high (HENDERSON 1998, p.117; TRAILL 1996, p.63; KOHLS & UHL 1998, p.215). The following generalisation can be made (see KOHLS & UHL 1998, pp.24-25): (i) economies of size are greater for highly capitalised food industries (such as dairy processing, flour milling) than for lower-capital industries (egg or fruit and vegetable packaging); (ii) many food processing plants are much larger than is justified by economies of size (see Table 29 on the next page): in virtually all listed sub-markets in the table the four largest companies are much bigger than the minimum efficient size. Moreover, what appears from this table is that food processing companies do not have to be very large to achieve maximum scale efficiencies (see also HENDERSON 1998, p.117). (iii) Some research suggest also that economies of scale are more important in larger food processing companies than in smaller ones (see CARAVELI & TRAILL 1998). This finding might then explain why very often food industry companies are much larger than MES: if cost savings become more important at larger company sizes, it would provide a strong incentive for companies to grow and for industries to become more highly concentrated (*ibid.*, p.311). This fact is also supported by statements of the US National Commission on Food Marketing which argues that the smallest companies in the food industry suffer handicaps because of inefficient size; medium-sized plants are operationally as efficient as larger plants; but the larger companies experience in addition economies of size in advertising and sales promotion (see KOHLS & UHL 1998, p.215). Therefore, in order to understand this situation better, it is important to have a closer look at the cost structure of food and drink processing/manufacturing.

In summary, it becomes clear that food and drink processing/manufacturing is a comparatively mature economic activity in which total factor productivity has been growing only slowly and is falling from year to year. Food and drink processing/manufacturing also seems to be more capital-intensive than other manufacturing industries, but this may depend on the actual sub-industry considered. Economies of size are in general small in food and drink processing/manufacturing, but they are more important in capital-intensive sub-sectors and for larger companies which are able to spread their large marketing/advertising budgets over more units and thus achieve lower total unit costs.

scale company size. Of course, all these causes for economies of scale, scope & experience describe theoretical effects only. In practice, all these points can also give rise to diseconomies. The size and direction of the effect will always depend on the actual situation.

Table 29: Potential no. of companies and four-company sales concentration ratios by country and product group, in food processing industries, mid 1980s

Industry	France		Germany		Italy		UK		USA	
	S/MES	C4(%)	S/MES	C4(%)	S/MES	C4(%)	S/MES	C4(%)	S/MES	C4(%)
Salt	39	98	62	93	24	80	39	99	194	82
Sugar	46	81	40	60	31	72	41	94	128	46
Flour	392	29	580	38	652	7	346	78	1 590	55
Bread	2 845	5	3 824	7	3 015	4	2 114	58	4 350	25
Processed meat	745	23	1 465	22	1 245	11	-	-	5 000	19
Canned vegetables	1 569	40	-	-	93	80	480	81	3 230	50
Soup	14	91	25	84	-	-	36	75	213	75
Margarine	79	-	181	-	34	-	154	-	455	-
Soft drinks	16	70	89	-	20	84	47	48	910	89
RTE cereals	-	-	-	-	-	-	7	79	55	86
Mineral water	400	77	350	27	337	55	9	73	-	-
Sugar confectionery	143	51	353	39	116	29	279	38	1 000	27
Biscuits	88	62	43	49	69	46	130	62	286	68
Baby foods	50	88	40	83	41	88	27	80	250	90
Beer	18	82	68	25	10	55	46	59	181	81

Notes: S = market size; MES = minimum efficient size, defined as output of median plant as percentage of industry output.
 S/MES gives the number companies with MES which fit into a market.
 C4 = market share of the four largest companies in the sector.

Source: SUTTON J. (1991), *Sunk Cost and Market Structure*, MIT Press.

2.4.1.3 Variable costs, sunk costs and transaction costs

Variable costs, sunk costs and transaction costs have been claimed to affect the cost competitiveness of agribusiness companies (KENNEDY *at al.* 1997, p.389). Apart from these effects on individual companies it seems also interesting to investigate how these measures can be used to assess the structural particularities of food and drink processing/manufacturing industries as compared to other manufacturing industries. In the following, theoretical considerations and empirical facts will be presented which show that food and drink processing/manufacturing in many ways may indeed be a particular industry.

Variable costs in food and drink processing/manufacturing include all inventory, production, and distribution costs that tend to vary with output level (KENNEDY *at al.* 1997, p.389). Average variable costs are in general the most used measure to assess company competitiveness; not only because they are directly measurable, but also because they represent the minimum price that a company can charge during a limited period of time without risking its economic existence (*ibid.*). It is not always easy to define exactly what variable costs are, as opposed to fixed costs. The problem lies mainly in the time horizon which is used in the analysis: in the short-term almost all costs are fix as in general staff cannot be immediately be made redundant, stocks of inventory exist, it is not possible to cancel contracts with suppliers and marketing agencies from one day to the other, etc. In the long-run, however, no costs are really fix, as contracts can

be cancelled after a certain time, assets can be sold, staff can be laid off, etc. Unfortunately, common cost categories, such as e.g. employment costs in a company's accounting system can represent both variable and fixed costs, but their nature may differ from company to company. This makes sector analysis difficult as aggregate statistical data in general does not make any distinction between different categories of e.g. payroll costs. Nevertheless, in using the measure of value-added — which also defines the gross profit level of an industry — it may be possible to approximate variable costs at the industry level. In fact, material inputs are always directly related to manufactured output and every change in production level will directly affect the expenditure for material inputs, at least after stocks are cleared. Thus, even if material inputs may not include all variable costs of an industry, they may still be a good proxy for them. Then, as Table 25, Table 26, and Table 27 show, food manufacturing industries have a higher percentage of variable input costs than the all manufacturing industries' average, as the percentage of value-added is smaller. However, this need not be a real structural disadvantage, as it is profits that finally matter. Under the assumption of smaller payroll costs than in other manufacturing industries — and of all other costs are not being much different — food manufacturing can still be a profitable business. Table 30 shows payroll costs of food and drink processing/manufacturing industries as percentage of turnover as compared to the all manufacturing average in three countries. As it appears, payroll costs in Germany and the US in food and drink processing/manufacturing industries are structurally only about 60% of the all manufacturing average levels and about 80% in Australia. The reason for this can be seen in the generally low-skilled labour force employed in food and beverages industries. For example, Table 31 shows that in the EU-15 in 1997 just 11.0% of those employed in food, drink and tobacco industries had completed a higher education degree. But, as many as 44.7% of these staff had a primary or lower secondary education (EUROSTAT 2000, p.106). Also, the percentage of part-time workers and the female participation rate in this industry is generally higher as compared to the all manufacturing averages (*ibid.*).

Table 30: Payroll costs (wages and salaries) of food and drink manufacturing companies as % of industry turnover as compared to all manufacturing averages

	Germany (1996)	Australia (1998/99)	US (1997)
Food/drink manufacturing	14.6	12.4	9.1
All manufacturing	24.7*	15.8	14.9
<i>Food manufacturing as % of all manufacturing</i>	<i>59.1</i>	<i>78.5</i>	<i>61.5</i>

Note: *including mining industry

Sources: Statistisches Bundesamt (German Bureau of Statistics) (1999), *Fachserie 4.3*;
 ABARE (2001), *Australian Food Statistics 2001*; ABS (2001), *Manufacturing Industry, Australia*;
 US Census Bureau (2001), *Annual Survey of Manufactures*;
 Author's calculations.

Table 31: Composition of labour force in EU food, beverages and tobacco industries, 1999 (%)

Country	Women ¹	Part-time ²	Highly educated ³
EU-15	37.7	12.0	11.0
B	25.5	8.0	17.3
DK	37.6	20.1	9.6
D	49.1	19.7	14.6
EL	33.7	2.9	10.7
E	31.6	3.3	14.0
F	39.7	11.0	10.5
IRL	27.5	7.2	19.6
I	31.8	4.9	2.9
L	36.8	-	-
NL	35.5	25.5	14.6
A	31.0	11.4	3.5
P	46.0	5.8	4.5
FIN	58.2	9.1	16.2
S	29.6	13.3	-
UK	33.0	12.2	12.1

Notes: 1) EU-15 and EL, 1998; 2) EU-15, B and EL, 1998; 3) EL, 1998; EU-15, IRL, P and UK, 1997.

Source: EUROSTAT (2000), *Panorama of European Business*, p.106.

Thus, although material costs are proportionally higher in food and drink industries, labour costs are generally lower. In order to assess the effect of these findings on the bottom line of food and beverages companies, it is useful to have a closer look at the profits that these companies make, as compared to other industries. Table 32 lists profits and different profit ratios separately for the beverages and food industries and the average for all industries. The data are based on the world's 500 largest companies. Moreover, these figures are ten years' averages (1989-99), since profits can vary substantially from one year to another. As it becomes clear from this table, food manufacturing — and in particular the beverages industry — is considerably more profitable in comparison to the all industries' average. In addition, in both industries, profits are also less volatile than the average of all industries, as measured by the calculated coefficients of variation of the ten years' mean values.

Table 32: Profits in food and beverages industries as compared to all industries' total, 10 years' averages (1989-99) from Fortune Global 500 companies

Industry	No. of firms included	Turnover US\$bn	Profits US\$bn	Assets US\$bn	Equity US\$bn	Employees ('000)	Profits as % of turnover	Profits as % of assets	Profits as % of equity	Assets per employee US\$
Beverages	10.5	89.9	7.2	114.4	39.2	489	8.4	6.7	19.8	291 192
Coef. o. variat. (%)	58.9	27.2	23.2	30.8	31.7	60.4	26.1	28.8	31.9	39.0
Food manufacturing	27.7	313.8	11.9	239.8	73.4	1 552	3.9	5.0	16.3	160 066
Coef. o. variat. (%)	68.2	27.9	25.5	26.8	25.3	36.8	14.8	14.5	12.8	11.4
All industries' total	500	8 580.7	285.7	21 925.4	2 863.2	32 114	3.2	1.8	9.6	613 519
Coef. o. variat. (%)	-	39.0	56.9	73.3	43.3	21.2	34.3	64.3	31.9	62.0

Source: Author's calculations from *Fortune Global 500*, various issues.

Thus, it become clear that variable costs in food and drink manufacturing industries may actually be lower than in other manufacturing industries — despite proportionally higher material input costs — due to substantially lower payroll costs. In assuming that other costs do not differ significantly from the ones in other industries, this should then result in higher profits, which is the situation found in the real world.

Sunk costs can be defined as expenditure on assets for which there is no (second-hand) market, i.e. once these expenditures are made they are "sunk" or lost (PRATTEN 1991, p.25). Expenditure on research and development and marketing are typical examples of this kind of costs (*ibid.*). Sunk costs can act as barriers to entry to a market for new companies, since they signify large initial investments combined with a high risk of never getting any return on them. Food and drink manufacturing/processing has often been characterised as a "low-tech" industry (see e.g. TRAILL 1997, p.401; RAMA 1996, p.124; GALIZZI & VENTURINI 1996, p.133), meaning that R&D expenditures in this industries are low as compared to other industries. Table 33 presents data which support this argument: based on a survey of 300 international corporations, food and beverages manufacturers in 2000 had R&D expenditure ratios of only 1.9% and 2.0% of turnover respectively, compared to the average ratio for all industries of 4.7%. Also, R&D spending per employee at US\$3 900 and US\$5 700 respectively were significantly lower than the all companies' composite figure of US\$13 900. Thus food and beverage manufacturing can indeed be considered as a low-tech industry. R&D levels are even smaller when measured at the aggregate sector level, as shown in Table 34. As these data include also the smaller — and presumably even lower-tech companies — the average R&D spending as percentage of turnover lies only at around 0.2% for German food and drink processing/manufacturing industries from 1995-99. On the other hand, marketing spending is comparatively high in these industries. Table 34 lists marketing expenditures of the German food processing industry for the years 1995-99. As it stands, annual marketing expenditures at 2.3% of turnover are more than ten times as high as R&D investments for each listed year. This shows clearly the importance of advertising in food manufacturing industries. Of course, not all of the marketing expenditures may be sunk costs, as — apart from animating people to buy the products — the money spent serves also to build brands, which can be sold later and thus investments may at least partly be regained (see for a quantitative analysis of the creation of intangible capital through advertising in US food industries e.g. WU & BJORNSEN 1996). This is actually also true for R&D expenses: once patents are registered and eventually sold, initial investments may be amortised (*ibid.*). Nevertheless, high marketing spending can still serve as barriers to entry to new companies, as only heavy advertising may lead to the necessary profit levels, which allow a new company to stay in the market. For example, based on a sample of leading US food manufacturers Table 35 shows that companies with higher advertising levels are more competitive and more profitable than those with low marketing efforts. A similar relationship is true for R&D spending: higher levels seem to assure higher competitiveness and profit ratios.

Table 33: R&D spending of top companies in different industries, 2000

Rank -ing	Industry	No. of firms incl.	Sales 2000 \$m	R&D spend 2000 \$m	% chg.	As % of sales	R&D per emp \$'000	Previous R&D investment		
								1999 \$m	1998 \$m	1997 \$m
1	Software & IT services	20	71 259	10 500	21	14.7	39.5	8 685	7 480	5 621
2	Pharmaceuticals	38	336 978	43 145	16	12.8	38.2	37 264	33 472	31 072
3	Internet retailers	1	2 762	285	79	10.3	31.7	160	47	12
4	Health	11	54 155	5 123	18	9.5	20.8	4 336	4 024	4 167
5	IT hardware	62	930 067	76 093	17	8.2	23.8	64 990	62 101	54 932
6	Electronic & electrical	26	450 520	26 626	0	5.9	11.1	26 602	25 260	23 743
7	Chemicals	22	255 695	12 111	7	4.7	14.4	11 317	10 779	10 190
8	Aerospace & defence	14	237 516	10 903	13	4.6	8.9	9 006	8 821	7 546
9	Media & photography	6	59 265	2 594	4	4.4	11.2	2 291	3 344	3 548
10	Automobiles & parts	30	1 253 071	50 110	3	4.0	11.8	45 885	41 835	36 292
11	Leisure & hotels	2	13 167	499	2	3.8	7.2	491	850	320
12	Engineer. & machinery	18	162 329	5 969	4	3.7	8.9	5 549	6 106	5 330
13	Household goods	4	24 684	878	-3	3.6	6.5	903	816	696
14	Personal care	7	103 896	3 525	8	3.4	9.4	3 251	3 235	2 905
15	Telecommunications	7	274 872	5 708	-6	2.1	5.7	6 072	5 289	5 860
16	Beverages	1	9 396	188	3	2.0	5.7	182	174	176
17	Food processors	3	102 176	1 966	16	1.9	3.9	1 689	1 535	1 350
18	Construction & building	3	46 116	770	-13	1.7	3.6	887	828	1 382
19	Electricity	3	79 260	1 202	-	1.5	10.8	-	-	-
20	Steel & metals	5	72 057	992	31	1.4	3.4	627	662	706
21	Diversified industrials	7	318 691	4 075	11	1.3	3.6	3 679	2 691	2 462
22	Tobacco	2	101 551	955	13	0.9	4.4	847	837	851
23	Oil & gas	8	727 908	3 193	10	0.4	4.7	2 905	3 255	2 601
All companies composite		300	5 687 391	267 410	10	4.7	13.9	237 618	223 441	201 762

Note: Based on top 300 international companies' data

Source: Adapted from Financial Times (September 27 2001), p.24. See also <http://surveys.ft.com/scoreboard2001>

Table 34: R&D and marketing spending of the German food processing industry, 1995-1999

	1995	1996	1997	1998	1999
Nominal turnover (DMbn)	221.0	222.5	231.0	228.6	228.1
Investments (DMbn)	7.8	8.2	7.7	7.5	9.6
as % of turnover	3.5	3.7	3.3	3.3	4.2
Marketing (DMbn)	-	5.0	5.1	5.3	5.2
as % of turnover	-	2.3	2.2	2.3	2.3
R&D (DMbn)	0.475	0.483	0.417	0.422	0.410
as % of turnover	0.22	0.22	0.18	0.19	0.18

Source: Bundesvereinigung der Deutschen Ernährungsindustrie (BVE) (German Food Industry Association), www.ang-online.de/bvedaten.htm
Stifterverband Wissenschaftsstatistik (2000), *Forschung und Entwicklung in der Wirtschaft* 1998.

Although the data presented in Table 35 may be misleading since the actual sample size is unknown, and apparently it is not controlled for other effects, such as e.g. company size or sub-industry membership etc., a positive effect of advertisement intensity on company profitability has also been shown in other empirical studies. For example, VLACHVEI & OUSTAPASSIDIS (1998) and GIANNAKAS & TZOUVELEKAS (1998)

showed both independently from each other the positive and statistically significant effect of advertising on the profit levels of Greek food manufacturing industries.

Table 35: Input intensity and competitive performance, leading US food manufacturers, 1995/96

Indicator	Competitive Index ¹		Profitability ²	
	0.5-1.0	0.0-0.5	Above 9%	Below 9%
R&D expenditures/total sales	1.26%	0.56%	1.36%	0.59%
Advertising expenditures/total sales	11.22%	4.46%	11.55%	6.22%
Intangible assets/total sales	27.60%	30.30%	28.00%	28.70%
Competitiveness index, mean	0.74	0.38	0.63	0.63
Profit rate, mean	10.10%	7.70%	13.60%	5.10%

Notes: Compiled from annual reports of a sample of leading US food manufacturing companies.

1) Combined rate of earnings on assets and international sales as a share of total sales, indexed to 1 for the highest company.

2) Net earnings as a percentage of total assets.

Source: HENDERSON D.R., 'Between the Farm Gate and the Dinner Plate: Motivations for Industrial Change in the Processed Food Sector', in OECD (ed.), *The Future of Food*, 1999, p.117.

In summing up, it becomes clear that sunk costs in food and drink manufacturing/processing may not be significantly higher than in other (manufacturing) industries. Although marketing efforts are comparatively high, R&D investments are rather low, thus making it difficult to come to a final and secure conclusion about the relative level of sunk cost in this particular industry. However, it appears that both high advertising and R&D investment levels positively affect competitiveness and profitability in food and drink manufacturing. This finding completes the results from the economies of size discussion above, which already suggested that larger companies can lower unit (marketing) costs in stretching total costs over larger output. Thus, large companies with high marketing budgets can realise lower unit costs and at the same time their advertising efficiency seems also to rise. These double gains arising from large company sizes may therefore contribute to explain the existence of very large global food manufacturing corporations.

Transaction costs include a variety of expenditures incurred by companies which attempt to remedy incomplete information and imperfect commitment in their exchanges in goods and services (KENNEDY *et al.* 1997, p.389). They are a measure of how difficult and costly it is to secure exchanges of goods and services between parties which are willing to do so. These costs thus include everything from identifying the right trading partner to maintaining the relationship after the first deal has been completed. However, the difficulty with these costs is that in many cases they do not appear on a company's balance sheet, as they are implicit rather than payable costs (*ibid.*). Moreover, often such costs are external to a company, i.e. caused by industry structure, geographical location, product characteristics, the nature of a very particular business, etc., but they still have an impact on company competitiveness. The effect of transaction costs on the management of international food marketing activities will be discussed in more detail in Section 3.1.1.1. At the industry level, however, it is hard to find data which quantify the size of transaction costs and which would allow an assessment of their impact on food and drink manufacturing/processing as compared to other industries. Food and beverages industries, however, can be characterised

in general by the following structural aspects: (i) the perishability of most products asks for a need to market them rapidly, which may involve in many cases a seller's acceptance of first-best offers rather than leaving him time to identify the best buyer; (ii) a seasonality pattern in the availability of most inputs, combined with sometimes considerable production risks caused e.g. by weather conditions affecting the security of the supply chain, and thus preventing the creation of long-term contracts, at least in some cases; (iii) most food manufacturers in western industrialised countries face an often very concentrated customer structure in form of retailers with considerable bargaining power, forcing manufacturers to slash prices, thus resulting in transaction costs in the form of not attainable profits. All these factors suggest that transaction costs in food and drink manufacturing industries may be above the level of other industries, but as already mentioned, it is very hard to show this empirically.

In summary, the cost structure of food and drink manufacturing may indeed be particular as compared to other (manufacturing) industries. Variable costs seem to be smaller in food and drink manufacturing, as profits are generally higher and there is no reason to assume that fixed costs are significantly larger. Sunk costs, too, seem to be smaller, as R&D investments are lower, despite high marketing spending. However, not all money spent for advertising or R&D is potentially lost: some of it increases a company's intangible capital, thus raising its market value. On the other hand, it appears that marketing efforts become more efficient with larger company sizes, as advertising costs can be spread over more output units, thus reducing total unit cost. In addition, advertising seems also to become more effective from a certain level on. Therefore, even if sunk costs may not be significantly higher than in other industries, the need to reach a critical mass — i.e. a minimum company size — for marketing reasons may still create considerable barriers to entry into food and drink markets, and may help to explain the existence of very large international consumer food product companies. Transaction costs in food and drink manufacturing, finally, may be structurally higher than in most other industries, given the generally perishable character of most food products, and the 'natural' risk involved in their production. In any case, with respect to international trade it becomes clear that even despite an above average profit potential, comparatively high barriers to entry and transaction costs can cause food and drink manufacturing in general to be less attractive for internationalisation activities than other industries.

2.4.1.4 The world's main actors and export performance of German food industries

The world's 50 largest food and drink manufacturing/processing companies at the turn of the millennium are presented in Table 37. The data provides an overview of their turnovers, their degree of internationalisation, their involvement in food/drink manufacturing, and their (operating) profits. There is a wide variation in the values for the individual companies, thus making it difficult to find some regularities in the data. In fact, although it seems possible on theoretical grounds that there could be a causal relationship between operating profits (dependent variable) and company size (as measured by turnover), degree of internationalisation (as measured by the percentage of foreign sales in total sales), and the percentage of food sales in total sales (all independent variables), no statistically significant relationship could be found using regression analysis.⁶¹ Thus, none of these variables seems to have a systematic impact on the operating profit level of these 50 companies.

More aggregated data based on this sample of 50 companies is presented in Table 36 providing averages for different country groups. As it becomes clear, Anglo-American countries are the home of the world's largest food and drink manufacturing corporations: 31 out of the 50 companies have their headquarters in these countries and these companies account for almost 70% of the combined turnover of all 50 companies. Moreover, companies coming from Anglo-American countries are also the most profitable ones, with an average operating margin of 11.2% far above the 9.3% average for all companies. However, the companies situated in these countries are among the least internationalised ones, with only 42.2% of sales outside their home country. The second most important geographic area for large food and drink corporations are Romanic countries (France, Switzerland and Italy), followed by the Benelux countries (The Netherlands and Belgium) and Denmark. Germany has only one single company among the world's 50 largest, which is characterised by a comparatively low profitability. The data of the world's leading food and drink manufacturing companies confirms what already has become clear from the industry data discussed above: Anglo-American food and beverages manufacturing/processing is the largest-scale and most profitable one in the world.

Table 36: Average values for country groups based on the sample of 50 world leading food and drink manufacturing companies, 1999

<i>Country group</i>	<i>No. of companies</i>	<i>Sum of food sales (US\$m)</i>	<i>Average of food/drink as percentage of total sales</i>	<i>Average of foreign as percentage of total sales</i>	<i>Average of operating profit margin (%)</i>
Anglo-American (incl. ZA)	31	423 781	84.9	42.2	11.2
Romanic (CH/F/I)	4	76 258	94.1	79.5	8.4
Japan	9	63 873	89.0	10.8	3.8
NL/BEL/DK	5	41 217	83.9	73.3	8.8
Germany	1	4 814	100.0	53.3	7.3
<i>All firms</i>	<i>50</i>	<i>609 943</i>	<i>87.7</i>	<i>38.2</i>	<i>9.3</i>

Note: Averages are unweighted means.

Source: Author's calculations from Table 37.

⁶¹ The calculated regression is as follows: PROFIT = **112.1** + 0.00*TURNOVER - 0.34*FOOD_SHARE + 0.12*FOR_SALES
N=46; Adj. R²=-0.11; F=0.832; DW=2.52; t= (2.59) (1.15) (-0.74) (0.36).

Table 37: World leading food and drink processing/manufacturing companies, 1999¹

Company	Head-quarters	Food/drink sales (net US\$ mil)	Food/drink as a percentage of total sales	Foreign as a percentage of total food sales	Operating profit margin (in %) of food business
1. Nestlé S.A.	CH	46 663	84.1	98.4*	10.6# ²
2. Philip Morris Companies	US	30 652	39.0	31.1	15.7
3. Unilever N.V.	NL/UK	21 825	50.0	58.0**	10.1
4. Coca-Cola Co.	US	19 805	100.0	62.0***	20.1
5. Con-Agra Inc.	US	19 269	78.3	14.6*	4.9
6. PepsiCo Inc.	US	18 244	89.6	27.1***	15.2
7. Diaego	UK	17 909	92.6	64.1**	15.7
8. MM/Mars	US	15 000 ³	90e	n/a	n/a
9. Archer Daniels Midland Co.	US	14 283	85e	35.0	5.0
10. IBP	US	14 075	100.0	15.3*	3.8
11. Groupe Danone	F	13 634	96.2	62.7*	10.5
12. Asahi Breweries Ltd.	J	13 126	96.2	<10.0*	6.9
13. Anheuser-Busch Inc.	US	9 710	83.0	6.5	23.2
14. Eridania Beghin-Say	F	9 603	100.0	79.4	4.2
15. The H.J. Heinz Company	US	9 300	100.0	45.4	11.9
16. Snow Brand Milk Products	J	9 015	86e	n/a	1.4
17. Bestfoods	US	8 637	100.0	58.3***	15.4
18. RJR/Nabisco Inc.	US	8 268	100.0	28.8	13.2
19. Farmland Industries	UK	7 922	74.0	29.8*	1.6
20. Kirin Brewery Co. Ltd.	J	7 895	82.6	n/a	8.9
21. Nippon Meat Packers Inc.	J	7 894	100.0	7.5	4.8
22. Sara Lee Corp.	US	7 876	45.6	45.5*	12.3
23. Heineken N.V.	NL	7 618	100.0	85.1	11.2
24. Kellogg Co.	US	6 984	100.0	42.5	11.9
25. Cadbury Schweppes PLC	UK	6 959	100.0	77.0	14.7
26. Associated British Foods PLC	UK	6 956	100.0	31.1**	5.5
27. Tyson Foods Inc.	US	6 550	89.0	3.0*	6.6#
28. Campbell Soup Co.	US	6 424	100.0	25.2	19.8
29. Parmalat Finanzaria	I	6 358	100.0	69.0**	7.3
30. Tate & Lyle PLC	UK	6 094	82.3	84.6*	4.9#
31. Yamazaki Baking Co.	J	5 999	93.0	<10.0*	1.1#
32. General Mills Inc.	US	5 848	93.6	4.6*	16.3#
33. Ajinomoto Co. Inc.	J	5 649	72.2	17.0*	4.0
34. Meiji Milk Products	J	5 331	86.2	<10.0*	2.0
35. South African Breweries	ZA	5 280	85.4	48.6*	13.0
36. Dole Food Company	US	4 823	95.3	58.5*	4.3
37. Südzucker AG	GER	4 814	100.0	53.3	7.3
38. Quaker Oats Co.	US	4 725	100.0	18.3***	15.0
39. Nichirei	J	4 532	84.5	n/a	2.4
40. Itoham Foods Inc.	J	4 432	100.0	<10.0*	2.7
41. Procter & Gamble	US	4 381	11.5	49.8***	16.4#
42. Friesland Coberco Dairy Foods	NL	4 291	100.0	58.0	2.4
43. Flowers Industries	US	4 236	100.0	<5.0	4.3
44. Carlsberg	DK	4 015	89.6	80.4*	5.3#
45. Suiza Food Corp.	US	3 992	89.1	10.7*	6.5
46. Hershey Foods	US	3 971	100.0	<5.0	20.2
47. Smithfield Foods	US	3 775	100.0	8.1	4.9
48. Interbrew	BEL	3 468	95.8	83.4	12.9#
49. Interstate Bakeries	US	3 460	100.0	<5.0	6.5
50. Bass PLC	UK	3 370	44.5	23.9*	9.8

Notes: 1) calendar or financial year
2) trading profit
3) total business turnover, estimated
e estimated

* of total turnover
** outside Europe, of total turnover
*** outside North America, of total turnover
of total business

Source: Author's calculations from companies' annual reports.

German food industries' export performance for the years 1967-99, as measured by export ratios, i.e. the share of foreign earnings in total turnover, are presented in Table 38. These figures are given for several selected sub-industries and provide information on the development of their internationalisation processes. As it stands, the export ratio of the total food and drink manufacturing industry grew from 2.4% in 1967 to 11.4% in 1999, representing a mean annual growth rate of 5.2%. This was a much faster growth than for the manufacturing sector as a whole with an annual average of 1.8%, even if this sector started from an already much higher basis of 23.6% foreign earnings in 1977 increasing to 34.2% in 1999. With regard to the separate food and drink sub-industries, it becomes clear that consumer-oriented industries' exports grew more than twice as fast as intermediate food industries (4.2% annually on average as compared to 2.0%). In fact, the fastest growing consumer-oriented sub-industry was dairy processing, with a mean annual growth rate of 18.9%, starting with an export ratio of 0.3% in 1967 which increased to 18.7% in 1999. The next most important sub-industry is soft drinks with an annual export growth rate of 11.6%, followed by coffee and tea products with 8.3%. By contrast, among the intermediate food industries there is only one with an average annual export growth rate of above 10%: margarine with an average of 14.2% per year. But consumer-oriented food industries' exports did not only grow faster, they also showed a more stable growing pattern, as measured by the coefficients of variation (c.o.v.) of the growth rates. The lower this figure the less volatile the growth is, and consumer-oriented food industries' average annual export growth rates fluctuated by only 1.5% around their mean value in the period 1967-99, whereas for intermediate food industries the c.o.v. is 3.3%. For all food industries combined the c.o.v. is 1.4% which compares to 2.1% for the all manufacturing average. Thus, in sum it becomes clear that food-industries' exports grew more than three times faster than the all manufacturing average from 1967-99, albeit the export ratio of the combined food industries is still only about a third of the all manufacturing figure (11.4% versus 34.2% in 1999). Within the food industry, consumer-oriented food companies' exports grew almost twice as fast as intermediate food product companies, even though — here also — the former's level at 8.4% in 1999 is only about a third of the latter's (21.7%).

In summary, the data on the 50 world leading food and drink manufacturing corporations confirm the industry level findings discussed before that Anglo-American companies in this sector are much larger-scale and more profitable than the ones from other countries. However, within the sample of 50 companies, no statistically significant relationship between company size, the share of foreign sales in total turnover, the share of food/drink sales in total turnover, and the operating profit level could be found. At the same time, the data shows that German food manufacturers are hardly present among the 50 top world companies. An analysis of data on the export performance of German food and beverage industries from 1967 to 1999 reveals that companies in these industries displayed much higher export growth rates than the all manufacturing average, albeit starting from a much lower basis. Thus, even if German food and beverages manufacturing companies are hardly present among the world's leading companies, in particular consumer-oriented German food industries' export performance has grown fast during the last 32 years. The data confirm once again that the real growth in international agricultural trade is within manufactured consumer food products.

Table 38: Export ratios (foreign earnings as % of total turnover) of different food processing industries in Germany, 1967 to 1999

Consumer-oriented food industries													Intermediate food industries								Total food process.	Total manufact.	Food process./total manufact.
Notes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(13)	(19)	(20)	(21)	
Year	Meat	Fish	Fruit & Veg.	Dairy	Bakery	Pasta	Condim ents	Confect ionery	Soft drinks	Beer	Wine	Coffee & Tea	Mean	Milling	Starch	Casein, Dairy	Margar-ine	Animal Fats	Mean				
1967	1.1	9.5	1.6	0.3	0.5	-	5.6	2.7	0.3	1.8	1.4	1.2	2.4	7.3	8.4	7.3	0.4	38.6	12.4	2.4	-	-	
1968	1.0	7.0	2.2	0.7	0.8	-	5.3	3.3	0.4	2.0	1.6	1.6	2.4	7.2	8.3	9.0	0.7	34.6	12.0	2.6	-	-	
1969	1.2	6.9	2.7	0.7	1.2	-	5.1	3.6	0.6	2.1	1.5	1.8	2.5	9.6	7.1	9.0	0.9	36.6	12.6	3.0	-	-	
1970	1.0	7.3	3.1	0.8	1.2	-	5.3	3.6	0.5	2.0	1.5	2.2	2.6	10.3	6.2	8.3	0.9	30.1	11.2	3.1	-	-	
1971	1.1	7.2	3.1	0.9	1.1	-	5.7	3.7	0.5	2.0	1.4	2.6	2.7	10.6	7.7	10.3	0.9	33.7	12.6	3.2	-	-	
1972	1.1	7.3	3.4	0.9	1.3	-	5.8	4.4	0.4	1.9	1.5	1.9	2.7	11.6	8.2	8.8	1.1	31.2	12.2	3.4	-	-	
1973	1.2	7.5	3.6	1.0	1.9	-	5.6	4.4	0.3	2.0	1.5	2.8	2.9	13.2	8.5	9.5	1.3	25.6	11.6	4.0	-	-	
1974	1.4	7.3	4.1	1.9	1.8	-	6.3	4.9	0.5	2.1	1.4	3.0	3.2	12.2	9.4	11.7	1.1	31.2	13.1	5.2	-	-	
1975	1.7	12.9	4.1	2.0	1.8	-	5.4	4.7	0.4	2.8	1.5	2.9	3.7	14.0	9.2	11.2	0.9	38.5	14.8	5.1	-	-	
1976	2.0	14.3	5.3	2.0	2.3	-	5.0	5.1	0.3	3.4	1.5	4.9	4.2	13.1	10.5	13.0	1.9	39.0	15.5	5.4	-	-	
1977	1.5	14.6	5.5	6.4	1.7	2.5	4.6	6.3	0.7	3.5	3.7	5.0	4.7	14.2	13.4	13.6	1.0	42.0	16.8	6.3	23.6	26.7	
1978	1.4	13.0	6.2	6.4	2.3	2.3	4.5	7.0	0.7	2.6	3.7	5.3	4.6	15.1	13.8	14.8	1.0	42.4	17.4	6.5	24.0	27.1	
1979	1.5	12.3	6.4	7.6	2.5	3.6	4.9	6.6	0.8	2.7	3.9	4.8	4.8	16.1	17.4	16.9	1.7	44.2	19.3	6.8	24.0	28.3	
1980	1.7	12.8	6.6	8.8	2.7	3.9	5.9	6.3	1.2	2.8	4.8	4.5	5.2	19.2	18.9	18.9	1.9	43.7	20.5	7.5	24.3	30.9	
1981	1.8	13.5	7.8	9.9	3.0	3.5	7.1	6.6	1.7	3.4	5.7	4.4	5.7	17.7	22.6	21.6	2.6	40.5	21.0	8.3	26.0	31.9	
1982	1.6	14.0	9.0	10.1	3.3	3.4	8.6	7.3	0.8	3.8	6.5	5.8	6.2	16.2	24.2	21.4	1.9	38.3	20.4	8.5	27.1	31.4	
1983	1.8	14.0	10.1	9.3	3.2	3.8	10.0	7.4	0.9	4.3	6.5	7.8	6.6	12.6	27.7	20.1	1.5	39.7	20.3	8.5	27.1	31.4	
1984	1.9	12.1	11.0	10.9	3.0	4.8	8.4	9.1	0.8	4.9	6.7	9.1	6.9	13.1	29.8	18.7	2.1	38.0	20.3	9.4	28.8	32.6	
1985	2.1	12.1	11.6	12.1	2.7	4.7	9.7	11.1	1.1	5.5	7.6	7.2	7.3	14.0	30.3	20.6	2.2	36.5	20.7	9.9	29.6	33.4	
1986	2.3	11.7	10.9	11.5	2.9	4.6	8.4	10.6	0.9	5.6	6.4	7.8	7.0	11.9	31.0	18.0	2.4	39.0	20.5	9.3	29.7	31.3	
1987	3.1	12.5	11.0	12.5	2.9	4.4	8.3	9.3	1.2	5.3	5.0	6.7	6.9	11.0	32.5	20.3	2.6	34.3	20.1	9.1	29.7	30.6	
1988	2.5	12.4	11.1	13.6	3.1	4.4	7.5	9.9	1.2	5.2	5.6	8.7	7.1	12.2	32.8	18.5	2.6	35.7	20.4	9.4	30.4	30.9	
1989	2.7	12.7	12.8	13.5	3.2	3.7	11.7	10.6	1.5	5.2	5.7	9.4	7.7	12.4	34.5	19.2	2.8	40.3	21.8	9.9	30.8	32.1	
1990	2.4	11.3	11.1	12.1	3.0	3.7	9.3	10.2	1.6	5.2	4.4	8.7	6.9	13.7	33.4	16.4	3.0	40.4	21.4	9.0	29.2	30.8	
1991	3.1	10.6	10.2	12.6	3.2	3.3	10.2	9.6	1.3	5.1	3.9	7.7	6.7	13.1	35.6	14.7	2.9	38.0	20.9	8.4	26.8	31.3	
1992	2.3	11.9	10.3	13.2	2.9	2.5	9.1	10.4	1.5	5.1	3	7.2	6.6	13.4	33.8	15.7	3.2	38.4	20.9	8.7	26.8	32.5	
1993*	2.4	13.2	10.9	12.4	2.5	2.9	11.5	11.4	1.0	4.8	3.6	7.7	7.0	13.2	35.1	16.8	3.4	41.2	21.9	8.9	26.1	34.1	
1994	2.3	13.5	12.3	12.5	2.6	4.9	11.6	12.8	1.0	5.3	4.3	10.7	7.8	13.2	42.5	16.5	2.7	41.3	23.2	9.4	27.4	34.3	
1995	2.1	13.7	11.3	14.5	2.4	3.8	11.3	15.6	1.8	5.8	-	12.0	8.6	13.7	36.1	-	4.0	37.7	22.9	9.8	28.4	34.5	
1996	2.5	14.3	11.9	15.8	2.4	4.2	11.7	17.2	2.6	5.9	-	11.7	9.1	13.2	39.4	-	4.7	41.0	24.6	10.4	29.7	35.0	
1997	2.6	15.5	12.6	17.3	2.8	4.0	12.1	18.2	1.8	6.0	-	12.8	9.6	14.0	39.9	-	11.2	39.4	26.1	11.1	31.9	34.8	
1998	2.8	16.8	13.1	17.7	2.1	3.0	8.5	17.3	1.4	6.0	3.9	9.5	8.5	15.2	42.8	-	10.1	-	22.7	11.4	33.2	34.3	
1999	3.0	16.0	13.8	18.7	1.8	2.6	9.1	15.6	1.7	6.4	3.6	8.3	8.4	16.1	44.3	-	4.6	-	21.7	11.4	34.2	33.3	
Mean annual growth rate (%)	4.2	2.6	7.5	18.9	5.8	2.4	2.7	6.1	11.6	4.5	6.6	8.3	4.2	3.0	5.8	3.7	14.2	0.5	2.0	5.2	1.8	1.1	
Coefficient of variation (%)	3.5	6.1	1.4	2.4	3.5	9.9	6.0	1.7	3.3	2.3	4.6	2.6	1.5	3.5	1.8	3.2	2.9	18.5	3.3	1.4	2.1	3.2	

Notes: Data from companies with 20 or more employees only.

*From 1993 on data for reunified Germany.

(1) Processing & manufacturing of meat products

(2) Processing & manufacturing of fish products

(3) Processing & manufacturing of fruit & vegetable products

(4) Processing & manufacturing of dairy products & cheeses

(5) Production of bakery goods (without long-life products)

(6) Production of pasta and noodles

(7) Manufacturing of vinegar, mustard, essences and spices

(8) Manufacturing of chocolate and sugary confectionery

(9) Production and bottling of soda water and soft drinks

(10) Beer brewing industry

(11) Manufacturing of wine, fruit wine and sparkling wine

(12) Processing and manufacturing of tea and coffee products

(13) Unweighted mean representing year's average

(14) Manufacturing of grain mill products

(15) Manufacturing of starch & starch products

(16) Production of sterilised milk, casein & processed cheese

(17) Manufacturing of margarine and similar products

(18) Production of animal fats and lard

(19) Export ratios of all food industries including also those not given in the table

(20) Export ratios of total manufacturing and mining industries

(21) Food industry export ratios as a share of total manufacturing's export ratio (multiplied by 100)

Source: Bundesministerium für Landwirtschaft, Ernährung und Forsten (BML) (German Ministry of Agriculture, Food and Forestry) (ed.), *Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten der Bundesrepublik Deutschland*, various issues; Author's calculations (*italic* and **bold** figures).

2.4.1.5 Trade barriers

This last sub-section addresses economic aspects related to barriers to the international trade in manufactured/processed food products. First, the role of trade policy and world trade agreements for manufactured goods in general and for food products in particular is explored. Then, aspects which are especially relevant for food products, such as process and product standards are discussed.

Trade policies have been shown in empirical research to be nowadays only "a minor cause of variation in the manufactured/primary export ratio", i.e the share of manufactured goods in a country's exports (WOOD & BERGE 1997). The main reason for this is that trade policies have been harmonised during the last decades, together with a common international effort to reduce trade policy related barriers such as tariffs, quotas etc. In fact, an OECD (1997) study on the impact of the Uruguay Round Agreement on agriculture and processed agricultural products finds that (p.21)

For the majority of processed product items, the base tariffs reflect the applied tariffs in 1986 or existing bound rates. These base tariffs are usually not high, although the level varies between countries and products. Generally, it is non-competing products — either those not produced locally or where domestic production is competitive — which have not been tariffed and imports are either duty-free or face low tariffs. Product categories for which tariffication was not used extensively include: plants and flowers, coffee, tea and spices, seeds, straw and fodder, vegetable extracts and plaiting materials, fats and oils, alcoholic beverages and tobacco, wool, hides, skins, silk and other agricultural raw material. Tariff reduction commitments are likely to be of greater significance where tariffication has not been applied but where base tariffs are nevertheless relatively high. Examples of this are found for some categories in some countries (e.g. some fruit and vegetables in Japan and the US, alcoholic beverages in Australia and EU, vegetable oils in Japan).... The products for which tariffication has been used most frequently tend to be "sensitive" basic products and processed products containing significant amounts of those same basic agricultural products. Where processed products were subject to tariffication (i.e. previously subject to non-tariff barriers) the resulting tariffs are in most cases reduced by less than average over the implementation period. The majority of those products incorporate dairy products, such as skim milk powder and milk fat (e.g. US, EU, Japan, Canada, Norway), sugar (e.g. US, EU) and cereals to a lesser extent. New Zealand and Australia have hardly used tariffication at all, because they had few non-tariff barriers applying.

One big problem for processed food products is therefore that they can suffer from tariffs on intermediate inputs. Empirical research by LANCLOS & HERTEL (1995) and LANCLOS, HERTEL & DEVADOSS (1996) showed that e.g. for US food processing industries input tariffs are more important and more market-distorting than tariffs on the finished consumer products (output tariffs). Thus, reducing tariffs on inputs would lead to higher output levels per company and more food processing companies in the US, independent of the actual market structure (imperfect competition, monopolistic competition, etc.). Another problem for processed food products with regard to international trade policy is that manufactured foodstuff & drink items are often targeted in agricultural disputes for 'retaliation', as it is much easier to get a group of products together which meet the required value of the trade total specified for such retaliation measures, and because it is much easier to target exports from specific countries (HARRIS 1994, p.199). In summing up, it appears that trade policy related barriers to the international trade of manufactured/processed food and drink products in today's globalised world economy are only small, although some exceptions do exist.

Non-trade policy based barriers to trade, such as Technical Barriers to Trade (TBT) or Sanitary and Phytosanitary Standards (SPS), are the emerging issues in the current debate on obstacles in the international marketing of food and drink products (HOOKER & CASWELL 1996; NEFF & MALONOSKI 1996; WORLEY *et al.* 1995). Whereas TBT describe barriers which are related to the *process* of how a food/drink item is produced, i.e. its production technology, SPS refer to *product* quality attributes resulting from its natural or artificial composition. In fact, sanitary and phytosanitary measures aim to minimise risks for human, animal, and plant health and safety arising from diseases, pests, additives, contaminants, and toxins (NEFF & MALONOSKI 1996, p.20). Some examples are foodborne pathogens, heavy metals, and pesticide and veterinary residues (HOOKER & CASWELL 1996, p.412). The main purposes for governments to set process or product standards which need to be met by imported foods are to protect consumers and to foster competition among producers (WORLEY *et al.* 1995), and in some cases also to protect agricultural producers from imported animal or plant diseases (MACLAREN 1998). Although these motives are generally internationally accepted, the main problem with standards is that they are often developed individually by each country. As a result of their individuality or uniqueness, process or product standards may create barriers to the international trade in food and drink products (*ibid.*, p.101). Regulations become trade barriers when the marginal costs associated with meeting the process or product standards in the import market raises the overall cost of delivering the product to the foreign customers to the point that the product becomes uncompetitive in that market (*ibid.*, p.102). In addition to the cost of meeting quality and labelling standards, companies are faced with the risk associated with regulatory compliance (*ibid.*). Although TBT and SPS are regulated in international WTO agreements (NEFF & MALONOSKI 1996), trade conflicts still arise when governments prevent food products from entering the country because they are not seen as following the nationally required product or process standards. Typical recent examples are the EU's ban on US beef produced with growth hormones, the EU's ban of genetically modified foods, or raw milk products which are not allowed to be imported into the US or Australia. To sum up, national or regional product and process standards may have become the real obstacles for food and drink manufacturers seeking to market their products internationally, thus exposing companies to new and hard to calculate — and still political — risks.

In summary, there are two main categories of barriers to the international trade of food and drink products: (1) trade policy related barriers, such as tariffs or quotas, etc. may be seen to have become less important, due to international efforts of reducing such barriers. More market distorting than tariffs on the finished food/drink product may actually be levies on agricultural inputs, which may affect the cost competitiveness and output levels of food industries. Another problem with consumer food products is that they are often targeted in trade related retaliation actions. (2) process and product standards, such as Technical Barriers to Trade or Sanitary and Phytosanitary Standards seem to be the emerging issues in the discussion on barriers to the international trade in food/drink products. Although these issues are regulated by international trade agreements, the often nationalistic or regionalistic nature of these standards make them to effective trade barriers. In the future, producers of food and drink items may be faced with ever more complicated product and process standards, which may be seen as today's real obstacles to the successful international marketing of their products.

2.4.1.6 Summary and conclusions

This sub-section has explored the economic structure of the international food and drink industries and analysed in more detail its size and significance in several western countries compared to their aggregate manufacturing sector. Then, the role of total factor productivity and of economies of size in food and drink industries have been discussed. After an assessment of the cost structure of food and drink manufacturing, i.e. the extent of variable, sunk and transaction costs, the world's 50 largest food and drink companies and data on the export performance of the German food and drink industries was presented. Finally, issues related to international trade barriers have been examined. In conclusion it becomes clear that food and drink processing/manufacturing is *structurally* a basic economic activity, neither particularly labour nor overly capital intensive, thus being an industry in which it seems hard to achieve clear comparative production advantages. It is therefore difficult to explain international trade in food and drink products within the framework of traditional trade theory.

The international comparison of food and beverage industries of the EU-15, the US, Germany and Australia reveals that in Europe this economic activity takes place in comparatively small production plants and that its value-adding is considerably lower than in the US. The Australian food and beverage industries lie in between these two extremes. When food and beverage manufacturing is compared to the all manufacturing average — as measured by the employee per company and the turnover per company ratios — it becomes clear that food and beverage plants in the EU-15 are usually smaller than average manufacturing plants, but in the US they are larger than this benchmark. In all three continents turnover per employee is usually higher than the all manufacturing average, implying higher labour productivity levels. On the other hand, gross profits, i.e. the value-added, are in all three continents considerably lower as compared to the all manufacturing figure. Although it seems that economies of scale and productivity in food and beverage processing should be investigated in more detail, it becomes already clear that this industry seems structurally to be a high volume, low margin one.

Total factor productivity in food processing has been growing only slowly and is falling from year to year thus confirming that it is a comparatively mature economic activity. Food and drink processing/manufacturing also seems to be more capital-intensive than other manufacturing industries, but this may depend on the actual sub-industry considered. *Economies of size* are in general small in food and drink processing/manufacturing, but they are more important in capital-intensive sub-sectors and for larger companies which are able to spread their large marketing/advertising budgets over more units and thus achieve lower total unit costs.

The cost structure of food and drink manufacturing may indeed be particular as compared to other (manufacturing) industries. *Variable costs* seem to be smaller in food and drink manufacturing, as profits are generally higher and there is no reason to assume that fixed costs are significantly larger. *Sunk costs*, too, seem to be smaller, as R&D investments are lower, despite high marketing spending. However, not all money spent on advertising or R&D is potentially lost: some of it increases a company's intangible capital, thus raising its market value. On the other hand, it appears that marketing efforts become more efficient with larger company sizes, as advertising costs can be spread over more output units, thus reducing unit total cost. In addition, advertising seems also to become more effective from a certain level on. Therefore, even if sunk costs may not be significantly higher than in other industries, the need to reach a

critical mass — i.e. a minimum company size — for marketing reasons may still create considerable barriers to entry to food and drink markets, and may help to explain the existence of very large international consumer food product companies. *Transaction costs* in food and drink manufacturing, finally, may be structurally higher than in most other industries, given the generally perishable character of most food products, and the 'natural' risk involved in their production. In any case, with respect to international trade it becomes clear that even despite an above average profit potential, comparatively high barriers to entry and transaction costs can lead to food and drink manufacturing in general being less attractive for internationalisation activities than other industries.

Data on the world's 50 leading food and drink manufacturing corporations confirm the industry level findings that Anglo-American companies in this sector are larger-scale and more profitable than the ones from other countries. However, within the sample of 50 companies, no statistically significant relationship between company size, the share of foreign sales in total turnover, the share of food/drink sales in total turnover, and the operating profit level could be found. At the same time, the data reveal that German food manufacturers are hardly present among the world's 50 top companies. An analysis of data on the export performance of German food and beverage industries during 1967 to 1999 reveals that companies in these industries have displayed much higher export growth rates than the all manufacturing average, albeit starting from a much lower basis. Thus, even if German food and beverages manufacturing companies are hardly present among the world's leading companies, in particular consumer-oriented German food industries' export performance has grown fast during the last 32 years. The data confirm once again that the real growth in international agricultural trade is within manufactured consumer food products.

Two categories of barriers to the international trade of food and drink products exist: (1) trade policy related barriers, such as tariffs or quotas, etc. may be seen of becoming less important, due to international efforts of reducing such barriers. More market distorting than tariffs on the finished food/drink product may actually be levies on agricultural inputs, which may affect the cost competitiveness and output levels of food industries. Another problem with consumer food products is that they are often targeted in trade related retaliation actions. (2) process and product standards, such as Technical Barriers to Trade or Sanitary and Phytosanitary Standards seem to be the emerging issues in the discussion on barriers to the international trade in food/drink products. Although these issues are regulated by international trade agreements, the often nationalistic or regionalistic nature of these standards cause them to be effective trade barriers. In the future, producers of food and drink items may be faced with more and more complicated product and process standards, which may be seen as today's real obstacles to the successful international marketing of these products.

In conclusion it becomes clear that food and drink manufacturing is *structurally* a basic economic activity which seems to be neither particularly labour nor overly capital intensive. Moreover, R&D spending and economies of size are low. It may therefore prove hard to achieve clear comparative production advantages in food and drink manufacturing for nations, and thus to apply the traditional, production-based, theoretical framework to explain international trade in these products. Rather it needs to be explained, why in particular trade in consumer-oriented food and drink products — the real driver in international food trade — is growing much more rapidly, in order to understand the dynamics of international food product markets. The next section will do this in more detail.

2.4.2 *Food consumption in the 21st century*

The success of a food product in international markets depends on many factors. Getting access to distribution channels and having the product placed on supermarket shelves is certainly crucial. Even more important may be, however, to know what actually determines a consumer's decision making process when — in front of the shelves — he/she repeatedly chooses a particular product from many similar ones. Understanding therefore the 'mechanics' of consumer choice and the determinants of modern food consumption is important for product developers as well as for international marketers.

Traditional microeconomic consumption theory has provided one approach to model a consumer's product selection process. While having shed much light on how a rational, utility-maximising consumer should actually allocate his budget in an optimal way, it is also a rather limited attempt, because in general the decision is assumed to be based on product prices and consumer income only. Not surprisingly therefore, this theory has been commonly found to be rejected by most of available consumption data (THOMAS 1993, p.231). Moreover, many factors which influence product choice such as e.g. status, health, or environmental aspects of food products cannot be explained in a satisfying way with the traditional model. Thus, there is need for a new approach to consumption modelling, and a more specific one to the food selection process.

This section presents a new model of modern food consumption which is able to incorporate all the current issues that can affect modern consumers' food selection decisions. The proposed model is a dynamic utility accumulation model, rather than the traditional static budget allocation approach. The new model is specified for the food consumption problem only, thus implying necessarily less generality, but, on the other hand, it may provide a better 'fit' to the 'real' world. The organisation of this section is as follows: after a discussion of some current topics in international food consumption, traditional approaches to consumption modelling are reviewed. Then a new modelling approach will be presented, followed by implications for consumers and international food marketers which are derived from this new approach. Given the novelty, there is probably much scope for improvement. Nevertheless, this approach should be able to stimulate new discussion on the complexities of food consumption modelling in the very beginning of the 21st century.

2.4.2.1 *Current topics in international food consumption*

Demographic developments in most industrialised countries indicate declining rather than increasing demand for food products in the future. Population growth is generally low (e.g. less than 1% per annum in most EU countries) with the average population age rising, indicating lower total and per capita calorie needs in most industrialised countries in the 21st century (POOLE 1997, p.3).⁶² That is, the food product market, measured in terms of quantity (i.e. calories), cannot be expected to grow strongly in most of these

⁶² This scenario abstracts from a possible change in immigration policies which until now have limited large intakes of young foreigners from not industrialised but still largely growing countries. With bigger migrant intakes, declining population growth in industrialised countries could be compensated, and total (and per capita) food demand would increase. For a recent outlook on trends in world and regional population growth see e.g. The Economist (September 25 1999, p.17 & 60).

economies. However, there is scope for a change in the types of food products demanded, and thus for growth in terms of total market value.

Current food consumption pattern, partly a result of reduced house-hold sizes and increased female participation rates in the workforce, seem to be shaped by (see POOLE 1997, p.3; PIERSON & ALLAN 1994): (i) more out-of-home food consumption, (ii) higher value-added products with greater convenience attributes, (iii) a greater presence and diversity of ethnic foods, (iv) heightened consumer concerns for nutrition, safety, and health, and (v) growing sensitivity to environmental and social externalities such as production technologies, distribution systems, ecological sustainability, and animal welfare. These common movements seem to be present in many of the industrialised economies, and thus it appears that these countries are becoming increasingly similar in their food consumption pattern.

Convergence in food consumption has therefore been investigated empirically (see e.g. TRAILL 1997; HERRMANN & RÖDER 1995; GIL *et al.* 1995; HERRMANN 1994; CONNOR 1994). For example, CONNOR (1994) argued that Europe would follow the US way of food consumption (with a lag of 5 to 10 years), as a result of a catch-up process in incomes, prices and demographic factors. TRAILL (1997), in using broad product categories of FAO food balance sheet data, showed that the coefficients of variation in consumption across 29 European countries in 1990 were all smaller than in 1961, thus providing evidence that within European nations convergence in food consumption has been occurring, too, due to the increasingly similar economic conditions within the area. HERRMANN & RÖDER (1995) and GIL *et al.* (1995), in using OECD and EU consumption data respectively — and in applying more sophisticated methodologies of measurement — were able to confirm this finding. However, their results show that the degree of convergence was different across the analysed food nutrients (and also depended on the used measurement criteria) (HERRMANN & RÖDER), or the tendency developed differently across individual countries (GIL *et al.*). In addition, GIL *et al.* demonstrated that the speed of convergence diminished, i.e. convergence, to a large extent, took place in the 1970s and was less intensive during the 1980s (p.396). Finally, HERRMANN (1994), in analysing consumption of 15 food products in OECD countries between 1968 and 1988, found that convergence tendencies were considerably different for individual food products. For example, consumption in foods such as poultry meat was found to actually have diverged over time, and for others such as fruit and vegetable oil no significant trend could be revealed. To sum up, *some* convergence in food consumption across industrialised nations was found and it seems that once people are freed from income and product availability constraints, their food consumption pattern move towards an internationally similar diet. This can even occur when a national diet is believed to be more beneficial than the "international" one, as LAAJIMI *et al.* (1997) show for the case of Spain by the shift of Spanish consumers away from the traditional Mediterranean diet. However, it has also been shown that there are still considerable regional or national differences in food consumption.

Regional or national consumption differences are remaining present despite the tendencies of an increasingly similar diet in industrialised countries. Morris Tabaksblat, Chairman of Unilever, the food and other consumer goods manufacturing company which operates in 160 countries claimed that "all consumption is local" and adds that he doesn't believe that tastes will ever be the same in all countries of the world (Wirtschaftswoche #10, 1997, p.131). Alan Gordon, Chairman of GIRAG S.A., a Swiss food market research company put it this way (GORDON 1998):

The United Kingdom has traditionally had a "fuel" approach to food, currently being changed however by the remarkable culinary innovation and sales system of major retailers such as Mark & Spencer. The other "fuel" country in Europe is *The Netherlands*; the attitude is somewhat alleviated by the Indonesian ethnic influence. *France, Spain, Italy* and *Belgium* are firmly on the "pleasure" camp, with strong regional influences and culinary traditions passed from generation to generation. Eating well in these countries was not a function of class as it was in the United Kingdom. *Germany* is part "fuel" (attachment via discount stores to best food bargains), part "pleasure" - but in that country there is a massive attachment to *Reinheit* (purity, cleanliness in food) which can be traced back to the Middle Ages. ... *The United States* can be characterised by: (i) The "land of plenty": enormous helpings and the most serious obesity problem in the world. ... (ii) The homogenisation of eating habits, with the universal hamburger (the biggest source of saturated fat in the US diet) as a typical example. (iii) ... This is the land of the nutrition fads. (iv) A food industry responding via new product innovations to every possible consumer fad in the search for "added value" per kg of food product sold. ... In *Japan* it is the traditional "seafood and rice" diet with low saturated fat consumption. There is some Westernisation of Japanese eating habits, influenced particularly by strong tourism outside Japan.

Empirical research seem to confirm these views. For example, KRAUSE *et al.* (1995) performed a global market segmentation for value-added agricultural products. 119 countries were analysed, using factor and cluster analysis for 26 variables that possibly effect total and value-added food consumption, age distribution, media availability, female labour force participation, etc. The study identified 10 country clusters with distinctively different consumption characteristics. For industrialised countries three clusters were found: one with most of the EU member states, Australia, New Zealand, and Uruguay. A second cluster includes the Nordic countries, Iceland, the US, Canada, Japan, and Switzerland. The third cluster was formed by Singapore only. For Europe, GIL *et al.* (*op. cit.*) analysed the diet structure of 15 EU member countries using three main factors: (i) the share of average calorie intake deriving from animal products, (ii) the share of fish and meat consumption, and (iii) the share of calorie intake coming from fruits. Using the factor values for each country, a cluster analysis was performed which resulted in seven country groupings: Portugal and Spain; Greece and Italy; Benelux, France, Ireland and the UK; Austria, Germany and The Netherlands; Norway and Sweden; Finland; and Denmark. This result satisfies *a priori* expectations, apart from France, which in similar studies (see e.g. HENSON & LOADER 1991) was found to belong to the Mediterranean countries. Regional patterns of food consumption within the individual European countries were analysed by ASKEGAARD & MADSEN (1995). The researchers used survey data of 20 000 respondents provided by the Paris-based marketing research agency CCA (Centre de Communication Avancé). The survey was organised in a joint venture by the Europanel network of European opinion-research institutes. Instead of countries, 79 European regions were defined and the average values of each region for 138 food-related questions were used to identify areas with similar food-consumption pattern. A factor analysis reduced the 138 variables to 41 factors with *eigenvalues* greater than one, i.e. each factor explaining more than 80% of the variance found in the original variables.⁶³ A cluster analysis using these factor values grouped the 79 regions into 12 clusters of areas with similar food consumption pattern which to a very high extent rebuilt the EU countries, thus confirming the importance of national borders for consumers' food habits. Moreover, the cluster results also revealed that language barriers are an even more powerful separation criteria, as Germany, Austria and the German speaking parts of Switzerland were put into one single cluster. Respectively, the French speaking part of Switzerland ended up as being part in the cluster belonging to France.⁶⁴ For the US, regionality of food consumption was shown by LARSON (1998). His

⁶³ For a complete description of the research project and the methodology used see CATHELAT (1990) and ASKEGAARD & MADSEN (1995). For a short description of the results see also GRUNERT *et al.* (1996, p.38-46).

⁶⁴ The cluster analysis revealed also that some countries or cross-national areas are more homogenous with regard to food consumption pattern than others. For example, the most homogenous countries were found to be Denmark, Sweden, Germany (apart from Bavaria), and Switzerland (the German speaking part). In contrast, Norway, Austria, Greece, Portugal and Belgium were found to be less homogenous, as measured by the iteration steps needed in the cluster analysis to rebuild a whole country out of its regions (see ASKEGAARD & MADSEN 1995, p.22-25 or GRUNERT *et*

study, in using a cluster analysis of food purchases in 126 categories across 54 US areas, found 11 market groupings which distinctive differences in food consumption patterns. This finding may confirm SENAUER *et al.*'s (1991, p.70) conclusion that "... markets as well as people, will grow increasingly diverse. A growing mass market for homogenous food commodities may be a thing of the past". In order to understand the apparent contradictions between the findings of increasing similarities in food consumption on the one hand, and persistent local consumption pattern on the other hand, a deeper understanding of food consumption at the level of individual consumers is needed.

Similar types of food consumers across countries have been identified by GRUNERT *et al.* (1996, pp.46-73). Their survey study was based on representative national samples of 1 000 respondents each from Germany, France, and Great Britain. In an exploratory study 21 cross-culturally stable factors were identified which cover five broad food-related topics such as (i) *ways of shopping* (importance of product information, attitudes to advertising, enjoyment from shopping, speciality shops, price criteria, shopping list), (ii) *food quality aspects* (health, price-quality relation, novelty, ecological products), (iii) *cooking methods* (interest in cooking, looking for new ways, convenience, whole family, spontaneity, women's task), (iv) *consumption situations* (snacks versus meals, social event), and (v) *purchasing motives* (self-fulfilment in food, security, social relationships). First, aggregated national differences in German, French, and British food consumption habits were analysed which yielded similar results as already described above (see *ibid.*, pp.53-69 for a detailed description). Second, national consumer types were identified by means of a cluster analysis. In all three countries five cluster solutions proved to be the most readily interpretable and to be those results which discriminated best among consumers with regard to the underlying dimensions. Table 39 which follows summarises the findings on comparable consumer segments across the three countries.

al. 1996, p.42-43). Moreover, the three most important clusters, the German-speaking, the French-speaking, and the British one, were found to be different in the following characteristics (see *ibid.*, p.44-45): in the *Germanic areas* (Germany, Austria, Switzerland) food consumers were found to be very health conscious. They like food to be raw and natural, compact, dense, fried, spongy, marinated, sour, which melts in the mouth, can be put on biscuits, and has a complex taste. Furthermore, more than the average European food consumer they like fluid, crispy, sweet and sour, acid lemony, soft, crunchy food that can be torn apart and eaten with the fingers. People in this area prefer filter coffee, but they are only average users of wine, beer, coke, and other soft drinks. "Fast food" is not very popular. In the *French-speaking area*, food consumers were found to attach importance to the sensory enjoyment of food, to red wine, and mineral water. White wine, beer, coke, and tea are less preferred. There is a growing willingness to eat "fast food" and takeaway meals. The *British Isles* were found to have no strong food culture. Consumers there like sweets and pastries, but they are also found of a sour taste. British consumers drink above average instant coffee and tea. However, they consume little mineral water and red wine. These empirical results thus seem to strongly confirm GORDON's (*op. cit.*) statements on national differences in food consumption, cited earlier.

Table 39: Food consumer segments in three European countries

Type of food consumer *	% within a representative survey sample of 1 000 consumers per country		
	Germany	France	Great Britain
Uninvolved	21	18	9
Careless	11	n/a	27
Moderate	n/a	16	n/a
Conservative	18	13	19
<i>Rather uninterested</i>	<i>50</i>	<i>47</i>	<i>55</i>
Rational	26	35	33
Hedonistic	n/a	18	n/a
Adventurous	24	n/a	12
<i>Rather interested</i>	<i>50</i>	<i>53</i>	<i>45</i>

Notes: n/a = not applicable. Segments are cluster analysis results from 21 underlying cross-culturally valid factors.

* *Uninvolved* food consumers are the least interested in food and related activities (shopping, cooking, etc.); *Careless* food consumers are similar to the uninvolved but they are much less price conscious as them; *Moderate* food consumers show average interests in almost all aspects. They represent the French average consumer if the whole population would not be divided into segments; *Conservative* food consumers are not keen on new products and food should "taste as it always has"; *Rational* food consumers are interested in food and price conscious. Meals and shopping are planned. Health and environmental aspects matter. New products are accepted when offering a particular advantage; *Hedonistic* food consumers like shopping, cooking and new products. Eating in restaurants is frequently done; *Adventurous* food consumers are most keen on cooking and new products. Meals are not planned and eating out is frequently done. However, shopping is not very much appreciated in this group.

The characteristics of the individual segments differ slightly across countries. See source for a more detailed description of the country-specific segments.

Source: Adapted from GRUNERT K.G., LARSEN H.H., MADSEN T.K. & BAADSGAARD A. (1996), *Market Orientation in Food and Agriculture*, p.71.

It can be seen that there are quite similar food consumer types across the analysed countries. Even if the individual segments show country-specific particularities,⁶⁵ it can still be concluded that in each country about half of the population shows no great interest in food — and related activities such as grocery shopping and cooking — whereas the other half does. In Germany the division between the two groups appears to be exactly 50/50, whereas in Great Britain the former and in France the latter group has a small majority. Even if the study only investigated these three countries, it seems likely that in most industrialised countries — and probably in poorer countries as well — about half of the population — to a lower or higher extent — cares about what they eat, whereas the other half doesn't. This may then help to understand why and to what extent international food consumption will converge, and why at the same time regional or national diets can still continue to exist. If in each country a large proportion of consumers is willing to accept new products and consumption habits, whereas a similar large proportion of consumers prefer their traditional foods, then both trends can co-exist at the aggregate country level. *Conservative* food consumers may belong to the latter group, whereas *adventurous* ones will be part of the former. However, it is also possible that most consumers adopt — to a lower or higher extent — new foods and consumption habits, *and* also — at other occasions — still prefer traditional food, i.e. that both trends co-exist at the level of the individual consumer. Under this scenario then, both trends can also co-exist at the aggregate level. In order to better understand actual consumption behaviour, deeper insights into the 'mechanics' of consumer decision-making is required.

⁶⁵ A multidimensional scaling (MDS) diagram which visualises the cluster results for German and French consumers only can also be found in GRUNERT *et al.* (1998). The MDS configuration shows that although the country specific segments are similar with regard to their attitude towards new products and consumption habits, there is still a "clear cultural grouping of the segments" (p.13), indicating existing national differences across them.

2.4.2.2 Explaining international food consumption

Microeconomic theory provides the standard approach to consumption modelling. Some important extensions to it have been made within what is called *Neo-classical Consumer Theory* or *Household Production Theory*. All these concepts will be reviewed in the following, before a new modelling approach specific to food consumption is presented.

2.4.2.2.1 Traditional microeconomic consumption modelling

Traditional microeconomic consumption theory and demand analysis investigates the relationship between the demand for goods and their prices and the incomes (or expenditures) of consumers, under the assumption of utility maximisation and rational behaviour. That is, in mathematical terms, $\max U(\mathbf{q})$, where U stands for utility and \mathbf{q} is a vector of the quantities of n goods, subject to the income restriction

$$I = \sum_{i=1}^n p_i q_i \quad \text{where } I \text{ is income (or expenditure) and } p_i \text{ and } q_i \text{ are the price and quantity of each good } i,$$

respectively. The analysis is often restricted to the case of two goods only (i.e. $n = 2$), but even then the theoretical implications of this simple model are far-reaching and go into great detail. These theoretical results will not be reproduced here, however see TANGERMANN (1986) for a good introduction into the topic applied to the food consumer, SELEVANTHAN & CLEMENTS (1995) for an advanced treatment of demand analysis with interesting results for alcohol consumption in OECD countries, TOUMANOFF & NOURZAD (1994, Chapter 9) for algebraic consumer behaviour modelling using comparative statics techniques, and THOMAS (1993, Chapter 9) for a practical treatment of applied econometric demand estimation. The most useful result of this very reduced economic approach to model complex consumer behaviour — based on good prices and consumer incomes only — is the derivation of the concept of price and income (expenditure) elasticities. Applying these concepts to aggregate food consumption, own-price elasticities have consistently been found to be negative and inelastic (i.e. lying between zero and one in absolute terms). Income (expenditure) elasticities have consistently been estimated as positive but being also widely inelastic. Table 40 lists some recent estimates for OECD countries using advanced econometric techniques.

Table 40: Income and price elasticities of demand for food and beverages in 18 OECD countries

Country (sample period)	Income elasticities		Slutsky own-price elasticities	
	Food	Beverages	Food	Beverages
US (1960-81)	.61 (.14)	.28 (.32)	-.22 (.05)	-.11 (.12)
Canada (1960-81)	.96 (.22)	.59 (.37)	-.45 (.11)	-.32 (.17)
Australia (1960-81)	.26 (.21)	.83 (.27)	-.11 (.09)	-.35 (.12)
UK (1964-81)	.33 (.15)	1.03 (.17)	-.12 (.06)	-.38 (.07)
Germany (1960-81)	.62 (.11)	n/a	-.31 (.07)	n/a
Austria (1964-1981)	.21 (.21)	.50 (.32)	-.03 (.04)	-.07 (.06)
Switzerland (1960-81)	.97 (.09)	1.35 (.17)	-.42 (.06)	-.65 (.11)
France (1964-81)	.46 (.18)	.48 (.30)	-.22 (.09)	-.25 (.15)
Spain (1964-77)	.85 (.20)	.91 (.65)	-.18 (.06)	-.26 (.19)
Italy (1964-81)	.86 (.10)	.70 (.26)	-.12 (.05)	-.12 (.08)
Belgium (1960-81)	.49 (.18)	.98 (.37)	-.06 (.04)	-.12 (.09)
Netherlands (1952-77)	.50 (.15)	.62 (.18)	-.36 (.12)	-.50 (.15)
Denmark (1966-81)	.36 (.16)	.69 (.19)	-.16 (.07)	-.30 (.09)
Sweden (1964-81)	.55 (.12)	1.10 (.20)	-.28 (.07)	-.58 (.12)
Norway (1964-81)	.23 (.12)	1.14 (.20)	-.11 (.06)	-.50 (.10)
Finland (1960-1977)	.55 (.14)	1.28 (.28)	-.18 (.06)	-.43 (.14)
Iceland (1960-73)	.45 (.11)	.74 (.21)	-.28 (.07)	-.49 (.15)
Japan (1970-81)	.62 (.15)	n/a	-.19 (.06)	n/a
Mean	.55	.83	-.21	-.34

Notes: Pooled Maximum-Likelihood estimates of a specially adapted Working demand system model (see source, Chapter 4 for details).

Root-mean-square errors in parentheses obtained from 100 Monte-Carlo simulations (to test for homogeneity, symmetry and preference independence hypotheses; see source, Chapter 4 for details).

N/a = not available.

Source: Adapted from SELVANATHAN E.A. & CLEMENTS K.W. (1995), *Recent Developments in Applied Demand Analysis — Alcohol, Advertising and Global Consumption*, pp.178 and 180.

Inelasticity of food demand at the aggregate level should, however, not be surprising. In order to understand this, two cases need to be distinguished: (1) with rising incomes (or falling food prices) people actually consume more food, i.e. more *quantity* (calories); (2) with rising incomes (and rising total expenditure) consumers *spend* more on food, i.e. the share of food expenditure in total expenditure rises. Generally, the income elasticity μ and the (own-)price elasticity ε are defined as the percentage change in *quantity* demand per the percentage change in income (own-price), or $\varepsilon = \frac{dq/q}{dp/p}$, and $\mu = \frac{dq/q}{dI/I}$, respectively (see TOUMANOFF & NOURZAD 1994, p.79). Given this definition, aggregate food demand then can be expected to actually be income and price inelastic. (1) Food demand is income inelastic because food consumption is primarily controlled by physiological (i.e. energy) requirements. That is, people need to eat regardless whether they have income or not. Respectively, they will stop consuming food when their calorie needs are satisfied, regardless whether they could afford to buy more food or not.⁶⁶ With higher incomes consumers may switch from cheaper to more expensive food — i.e. with particular preferences they may e.g. choose to eat more in restaurants, or they may consume higher margins for processing, marketing, and service coming along with their food — and the share of food expenditure in total expenditure may then

⁶⁶ There is, however, some empirical evidence that people in rich countries eat more than they actually need. The United States — the richest country in the world — may be the best example, where 35% of the adult population is technically obese according to figures released in March 1997 by the US Department of Health and Human Services (see GORDON 1998, p.94). However, even despite this finding, there is still a physiological upper limit of the amount of food people can consume.

even rise, but in general consumers will rarely buy more than they can eat.⁶⁷ Therefore, food consumption can be expected to be income inelastic in affluent societies. (2) Food demand at the aggregate level is also very likely to be price inelastic, as there is no substitute for food. That is, if food as a whole — and compared to other aggregates such as housing, textile, transportation, etc. — becomes more expensive, consumers still need to buy it. That is, there is no choice (again apart from the switch from more expensive to less expensive foods, which, however, will not influence strongly total food quantity demanded). However, within the food group — and at the disaggregated product level — there are many choices between similar foods, and thus many available substitutes. For example, imagine someone who feels like eating something sweet and wants to buy a chocolate bar. As many consumers, this person may have a favourite brand as long as price differences between similar products are small. However, if price differences become too large for products that are perceived as close substitutes, she/he will switch to cheaper brands. Therefore, if the favourite chocolate brand is sufficiently more expensive as e.g. a competitor's product, which happens to be on special, a consumer is likely to buy the cheaper product. That is, demand for individual brands is highly price elastic. However, now imagine cocoa becomes more expensive on the world market, and as a consequence, all chocolate bars become relatively more expensive than let's say (non-chocolate) biscuits or ice-cream. Then choices are more limited. Those consumers who feel they can do without chocolate may choose other sweets. Others who feel that they still need chocolate in order to feel happy will still buy it, even if prices have become more expensive. Thus, the aggregate 'chocolate products' is very likely to be less price elastic than are individual chocolate brands. Now assume sugar becomes more expensive on world markets and, as a consequence, all confectionery becomes more expensive relative to cereal products, vegetables, meats, dairy products, etc. Now choices are even more limited: there is no real alternative to the sweet taste, and thus it seems unlikely that consumers will substitute sweets for other foods. Those consumers who really need to watch their budgets may substitute their carbohydrate needs for cereal products or potatoes, etc. However, many consumers will not accept this as a real alternative and despite higher prices they will still purchase sweets. It is therefore clear that, within the food group at least, price elasticities are a function of the number of available substitute products. That is, the higher the aggregation level, the less *real* choice exists, and the less price elastic goods will be. There is some empirical support for this hypothesis, see e.g. JONES (1997) who, in analysing US supermarket scanner data for several carbohydrates, finds that there is only weak substitutability between e.g. rice, potatoes, and pasta products. However, the estimated cross-price-elasticities show that there is strong substitutability within a product group, i.e. between e.g. (cheaper) home brand pasta products and (more expensive) national brand pasta products. Thus, JONES concludes that "... consumers look more within the product categories than across product categories when making purchase decisions about lower priced products" (p.610). Moreover, JONES' study reveals generally elastic and statistically significant own-price elasticities at the level of individual products, which stands in contrast to findings of inelastic US demand for selected aggregate carbohydrates groups (such as pasta, rice, and potatoes) which are based on *Nationwide Food Consumption Survey* (NFCS) data (see e.g. RICHARDS *et al.* 1998).⁶⁸ In summing up, it should have become clear that inelastic food demand, at the aggregate level at least, is not a surprising finding.

⁶⁷ Wine or spirits may be the only exceptions, since they can be stored well and can even be used as an investment.

⁶⁸ For a general discussion (in German) of different findings for food demand elasticities depending on data aggregation levels, and implications arising thereof see also HERRMANN (1997). For a description of the principal differences in the

The decreasing influence of income and prices for food product demand in industrialised countries during the last decades, however, may shed some doubts on the practical relevance of the traditional microeconomic consumption model. Table 41 lists the shares in private consumption expenditure that consumers in industrialised countries spent on food.⁶⁹ It can be seen that in 1993 in almost all these countries this share did not even reach 20%.

Table 41: Expenditure on food, cost per calorie, and average calorie consumption in 24 countries

Country	GDP ³ per capita, 1993	Spending on food ¹ as a share of private consumption expenditure ²	Expenditure on food per capita per year, 1993	Cost per 100 calories	Average calorie consumption per capita per day, 1992
	US\$	%	US\$	US cents	Calories
Japan ⁵	33 667	20.8	4 071	39	2 887
Switzerland ⁴	32 919	18.2	3 547	29	3 381
Luxembourg	31 590	11.8	2 043	15	3 681
Denmark	26 077	15.7	2 147	16	3 664
US	24 279	8.7	1 427	10	3 732
Norway	24 060	19.8	2 456	21	3 244
Germany ⁴	23 679	18.3	2 513	21	3 340
Austria	23 159	16.8	2 146	17	3 502
Iceland	23 075	20.1	2 811	25	3 058
France	21 779	15.5	2 057	16	3 632
Sweden	21 320	14.3	1 674	15	2 972
Belgium	20 957	15.0	1 948	14	3 681
Singapore	20 486	17.0	1 500	13	3 198
The Netherlands	20 237	12.5	1 543	13	3 222
Hong Kong	20 004	13.5	1 550	14	3 125
Canada	18 982	10.5	1 211	11	3 092
Italy	17 356	17.6	1 890	15	3 549
Finland	16 629	15.9	1 503	14	3 017
Australia	16 444	14.5	1 493	13	3 179
UK	16 255	11.9	1 242	10	3 317
Ireland	13 495	20.6	1 555	11	3 837
Israel	13 362	22.1	1 750	16	3 050
New Zealand ⁴	12 530	16.3	1 235	9	3 666
Spain ⁵	12 122	21.3	1 633	12	3 705

Notes: Computed from UN System of National Accounts, World Bank, and FAO data (see source for calculation details).

¹Includes food consumed at home only and non-alcoholic beverages. 1993 figures;

²Consumer expenditure for goods and services;

³Proxy for income, expressed in 1993 US\$;

⁴Food includes non-alcoholic and alcoholic beverages;

⁵Food includes non-alcoholic and alcoholic beverages and tobacco.

Source: Adapted from MEADE B. & ROSEN S. (1996), 'Income and Diet Differences Greatly Affect Food Spending Around the Globe', *Food Review*, USDA, Sept.-Dec., p.41.

Although these figures do not include food eaten away from home — which in some countries such as the US can account for up to one-third of total food spending (MEADE & ROSEN 1996, p.40) —, it still becomes clear that in industrialised countries average consumer's food choice is no longer constrained by income restrictions. Therefore an approach to model consumption based on income and prices only — although having yielded valuable theoretical insights as to how rational, utility-maximising consumers actually should behave — may no longer be a satisfying method to describe complex consumer behaviour in today's affluent societies. Moreover, it has been found that econometric estimations with available data have frequently

quality and usefulness for certain research purposes of the data from different sources (food balance sheet, expenditure surveys, purchase data, etc.) applied to the food consumer see also LESSER *et al.* (1986).

⁶⁹ For a good empirical survey on the relationship between income and food expenditure and the changes over time see also BLANDFORD (1986). However, this study lists data only until the beginning of the 1980s.

rejected important theoretical assumptions of consumer theory such as Symmetry and Homogeneity (THOMAS 1993, p.231).⁷⁰ Although it has been argued that existing estimation techniques may not yet be powerful enough to capture all expected effects (and in particular *dynamic* effects) (*ibid.*, p.232), it may simply be that there is a principle incompatibility between the postulates of how consumer theory expects consumers to behave, and the data, which reflect how consumers act in reality. THOMAS (1993, p.232) therefore concludes that "a household's spending pattern depends not only on prices and total expenditure but on vital demographic and social factors".

LANCASTER's product characteristics theory can be seen as a new approach to consumer modelling. Whereas traditional consumption theory can be considered as a "coarse-structure" theory, designed to analyse broadly conceived goods such as food, clothing, etc., LANCASTER's approach is the "fine-structure" equivalent, designed to deal with the choice between differentiated products within a group. LANCASTER (1991)⁷¹ defines utility over product characteristics rather than over market goods. That is, each unit of a market good (or commodity) q_i contains different units of different characteristics z_i ($i = 1, \dots, m$), and utility is defined as a function of the vector \mathbf{z} , i.e. $U(\mathbf{z})$, with $\mathbf{z} = \mathbf{B}\mathbf{q}$. The matrix \mathbf{B} is called *consumption technology* which describes the relationship between the market goods (inputs) and the utility generating product characteristics. This relationship is assumed to be linear, objective, and universal, i.e. the characteristics possessed by a good — or a combination of goods — should be the same for all consumers. The personal element in consumer choice arises from the individual selection of relevant characteristics only, not from the allocation of characteristics to the goods. Consumers differ because individual preferences determine the relative weights given to the various characteristics in making choices, and choosing different subsets of market goods are then optimal ways to achieve different preferred bundles of characteristics. As in the traditional model, there is a budget constraint $\mathbf{p}\mathbf{q} \leq I$ where \mathbf{p} is the vector of the market prices of the consumed commodities and I is the consumer's total income. The budget constraint is defined on the "goods-space" (G-space), whereas U is defined on the "characteristics-space" (C-space). To relate the budget constraint and the utility function, there are two possibilities: (1) to transform the utility function into G-space, i.e. $U(\mathbf{z}) = U(\mathbf{B}\mathbf{q}) = u(\mathbf{q})$ which is a new utility function that depends crucially on the structure of the matrix \mathbf{B} . (2) To transform the budget constraint into C-space, which will result in the need to determine the monetary value of each individual characteristic z_i , its so-called "shadow price". These price components can be quantified econometrically, a procedure which is known as *hedonic price estimation*. Either way, given a price vector consumers will maximise utility in that for every characteristics vector, they will choose the most efficient combination of goods to achieve that collection of characteristics, and the efficiency criterion will be minimum cost (*ibid.*, p.19). In short, LANCASTER's approach, as traditional consumer theory, is concerned with the optimal allocation of income (or total expenditure) between various goods, with the only difference being that marginal rates of substitution, now

⁷⁰ *Homogeneity* (of degree zero) means that an equiproportionate change in all prices and total expenditure should leave total demand unchanged, which in a n equation demand system implies that the sum of all price elasticities plus the total expenditure elasticity equals zero. *Symmetry* of the substitution effects (i.e. with constant income, the effect of an increase in the price of good j on the demand for good i is equal to the effect of a price increase of i on the demand of j) is another important theoretical restriction, as is *Negativity* of the own-price effects (SELVANATHAN & CLEMENTS 1995, p.7-8 & 161).

⁷¹ LANCASTER (1991) is a collection of earlier papers of the author, most of which were already published in the 1960s and 70s. In the 1991 book these papers are, however, adjusted to each other in order to create a coherent monograph, and they are supplemented with a summarising introduction. Therefore, in the following, only this book will be referred to instead of the original papers.

specified between characteristics, must equal the implicit characteristics price ratios, and not the market price ratios. Thus, the underlying economic rationale is in fact not new, just more difficult to apply.

Household production theory may be seen as an even more innovative approach to consumption modelling. BECKER (1965) argued that, similar to the LANCASTER model, households do not derive utility directly from market goods (or services). Rather households use these goods and services — together with their available time t — as inputs for the "production" of so-called Z-goods such as e.g. health, social standing and reputation, pleasures of the senses, etc. These non-market Z-goods are seen as the real sources of utility. Thus, the production of amount z_i of the i 's Z-good is a function of a vector of necessary market goods \mathbf{q}_i and the time t_i needed to transform \mathbf{q}_i into z_i , or $z_i = f(\mathbf{q}_i, t_i)$. The really new idea is, however, that there are actually two resource constraints that restrict the maximisation of the utility function $U(\mathbf{z})$. (1) There is the usual budget constraint where the sum of all expenditures on the purchased market goods must not exceed available income, i.e. (as defined above) $\mathbf{p}\mathbf{q} \leq I$. (2) The sum of the t_i , necessary to produce the Z-goods, must not exceed total available spare time, where this time is the difference between total available time for an individual, T , minus the amount of it spent working to generate monetary income, t_w , i.e. $T = t_w + \sum_{i=1}^m t_i$. However, both restrictions can be combined in a single one, using the wage rate w to calculate "full income" S , i.e. $S = wt_w + V$, where V is other non-wage income. S can then be transformed into $S = \sum_{i=1}^m (wt_i + p_i x_i)$, and this equation can be used in a Lagrange maximisation of the utility function instead of the usual income restriction. The maximum condition then yields $MU_i / MU_j = \frac{p_i(dq_i / dz_i) + w(dt_i / dz_i)}{p_j(dq_j / dz_j) + w(dt_j / dz_j)} = MC_i / MC_j$, where MU_x and MC_x ($x = i, j$) denote the marginal utility and the marginal cost of two Z-goods i and j , respectively. As it can be seen, the general maximum condition is, in principle, the same as for ordinary market goods. However, in this case, the marginal costs are shadow prices of the Z-goods, determined by the prices of the market goods and the opportunity cost of time t_i used for the production of Z_i . In short, the inclusion of production in the theory of consumption induces the household to minimise production costs and thus to maximise utility in response to changes in prices, productivity, relative shadow prices, and changes in full income. As a consequence, a decrease in the price of one of the production factors will force the household to prefer the production process which uses this factor more intensively, and to increase the consumption of the resulting good.

None of the presented approaches to describe consumption behaviour is, however, particularly useful in gaining understanding of why e.g. consumers may choose foreign food products over nationally produced ones, why international food consumption is becoming internationally more similar, or how "externalities" such as health and environmental concerns can significantly influence food product choice. In fact, all presented models are not so much models of product choice but rather models of optimal budget allocation. There is, therefore, need for a new approach to consumption modelling and in particular for one that is able to incorporate "new" determinants which influence product choice, and which is not based on income and prices only. Given the fact that these non-monetary determinants are less easy to quantify, this new approach will perhaps be less elegant and less mathematical. However, this does not necessarily mean that it has less analytical rigour. Moreover, it would be useful to specify a model specific for food consumption, which however will necessarily mean that it would be less general. But, on the other hand, this model may provide a more detailed and perhaps a more realistic picture of reality. Finally, a new

approach should still be an *economic* one, in the sense that it deals with limited resources, trade-off situations, and optimisation problems. After all, economics is concerned with any kind of resource allocation and it is not restricted to monetary variables only. Maybe one of the best summaries of the determinants of modern food consumption has been given by GOLDBERG R. (1999, p.228):

The choices of [food] consumers will be guided more and more by their search for the following: good value for money; better food safety; greater attention to the nutritional values and composition of products in order to follow a balanced diet; particular attention to the production process with a preference for products that have a low environmental impact and a "natural" value. It should be emphasised that food and diet have important entertainment and social values, especially in industrialised countries. These influence the buying decisions for certain goods by giving relevance to some emotional aspects such as: the image of luxury, the exclusivity of the product, the desire for self-gratification and adventure (for new foods or those originating from traditions different from one's own), the image of and values associated with the product's country of origin.

Another attempt to identify and to evaluate all factors that influence food choice (from a point of view of the social sciences) may be seen in the book *The Food Consumer*, edited by RITSON *et al.* (1986). Although this work offers many valuable insights in the complexities of the modern food consumption problem, it does not provide a formal model which would be able to incorporate at least some of the findings. In the following, it will therefore be attempted to lay at least the first foundations for a formal model of food consumption, and to draw some conclusions from it.

2.4.2.2.2 A dynamic model for modern food consumption

A broader perspective on food choice was provided by ROZIN *et al.* (1986, p.86) who argue that economic factors such as price, product availability, and income influence only the actual consumption (the 'use') of food, i.e. what and how much is chosen. However, this choice will not always reflect our real *preference*. One might 'prefer' steak to bread but still eat ('use') more bread because of its price or availability. Furthermore, people will not always prefer what they have a *liking* for (i.e. an affective response to a good as opposed to a rational one). A dieter might 'prefer' lettuce to cake but still like cake better. Of course, these concepts are clearly related. All other things being equal, people eat (use) what they prefer, and prefer what they like. Economic factors, thus, can influence the use but do not determine preferences or likings. Moreover, in times of economic affluence where higher real incomes mean less constraints on consumption choice for large parts of the population, it is obvious that personal preferences have become more important for purchasing decisions. Although individual preferences may be hard to determine and to quantify, they must still be considered in a modern model of food consumption. In fact, such a preference structure is similar to what LANCASTER (1991) calls consumption technology (matrix **B**, see above). It describes the mechanism of how from the objective characteristics of goods — equal to all consumers — the individual relevant characteristics, which actually spend utility, are selected and weighted. In the following food choice model individual preferences will be introduced as a matrix **P**ⁱ. This matrix gives the 'code of selection' which describes how objective food is transformed into subjective utility.

Utility from food consumption may, in general, result primarily from the consumption of a bundle of different foods. *Meals* are such food bundles composed of a variety of different foods and which are often accompanied by drinks. Furthermore, in some countries there is also a certain meal structure,

consisting typically of more than one dish, accompanied and finished by appropriate drinks.⁷² Similarly, even a 'fast food' meal consists normally of more than one item, a typical example may be the hamburger with chips (french fries) and a soft drink. Sometimes, of course, a meal can consist of a single food item only, then it is called a snack. Yet, in general, a meal can be described as a vector of different ingredients and accompanying products (drinks). In fact, some ingredients may only spend utility within such a combination of different foods. For example, spices or vegetable oils are mostly consumed as part of a (cooked) dish, and not very many people would eat pepper corns or olive oil on its own. Thus, it seems that the utility derived from a meal is more than the sum of the utility of the individual ingredients used for the meal. Moreover, a meal can offer even more than just nutritional value. Or, as LANCASTER (1991, p.13) put it:

A meal (treated as a single good) possesses nutritional characteristics but it also possesses aesthetic characteristics, and different meals will possess these characteristics in different relative proportions. Furthermore, a dinner party, a combination of two goods, a meal and a social setting, may possess nutritional, aesthetic, and perhaps intellectual characteristics different from the combination obtainable from a meal and a social gathering consumed separately.

Thus there are *positive externalities* (i.e. additional utility) that can come with a meal, and therefore a meal can be also be summarised as a vector of potentially utility spending characteristics.

Utility spending characteristics of meals can be classified into the following categories (see e.g. VON ALVENSLEBENS 1997; SCHAFFNER *et al.* 1998, Chapter 3; PIERSON & ALLEN 1994). The significance of each characteristic will be discussed in more detail later in this chapter.

Energy (calorie) needs may be seen as the main driver for food consumption. Every person needs calories in a limited range, i.e. there is a minimum and a maximum level. Moreover, food energy is needed regularly, i.e. generally it is not possible to eat only e.g. once a week and then do without food in between these "fill-ups". The calorie contents of a meal can be measured easily and in the following model it will be referred to it as c .

Taste and the desire to enjoy foods. This characteristic may not be important for all people, and it even will not be equally important for the same person at any meal. However, in general, most consumers will choose foods according to their individual taste requirements, other things being equal. This variable may be difficult to quantify and therefore in the following model it will be referred to it as θ .

Health proprieties of food may be scientifically justified or not, but for many people they seem to be important, and thus they do affect food choice. The "true" health value of a meal or a food may also be difficult to determine, therefore it will be referred to this variable in the following as ξ .

Status or *prestige* is another feature of a meal that can be very important for some people and unimportant to others. In almost every country, expensive restaurants can be found, and luxury food products such as caviar, champagne, etc. are available. But even for less expensive products such as e.g. beer or soft drinks the brand image can be a very important purchasing criteria. The "true" status contents of a meal (or a single food item) is again difficult to quantify, and in the following it will be referred to it as ψ .

⁷² For example, YON & BERNARD (1993, p.122) show for the case of France that there is "... a majority of consumers following the traditional way of eating: Three meals (breakfast, lunch and dinner) with a very structured composition of the main meals (starter, main dishes, cheese, and dessert)". However, ASKEGAARD & MADSEN (1995, p.2-3) show that in Europe a border exists which runs between Germany and France, through the southern part of Belgium, northern France and western Switzerland. North of this line there is an overwhelming preference for the 'single dish' meal, whereas south of the line there is a general majority in favour of the several courses comprising a 'composite meal'.

Environmental, political and ethical motives have become increasingly important for some food consumers. The growing significance of organically produced foods in many industrialised countries may be seen as evidence for this. Religious aspects of food choice may also be summarised within this factor. Once again, these characteristics are difficult to quantify and therefore it will be referred to in the following model as ϕ .

Time for food consumption is needed not only for the eating process itself; with it comes also time consuming activities such as shopping, cooking, washing up, etc. These activities, however, can be "outsourced" in our economically highly differentiated societies. Thus, people who value the opportunity costs of the time spent for preparation and accompanying activities as high can choose between industrially pre-cooked ready-to-eat dishes, take-away meals, or going to a fast-food chain outlet or a restaurant. The rapidly increasing significance of these services show that for many people the time needed to spend on food consumption is rather utility-decreasing than increasing. That is, many people may minimise these time requirements.⁷³ Time needed for food consumption can be measured; in the following it will be referred to as t .

The *price* or cost for a meal may also be seen as a utility-influencing characteristics of food consumption. Very often this aspect of a meal will be utility decreasing as it reduces the amount of the available budget needed or wished to be spent on other (non-food) items which may increase overall consumer utility by more. As food spending is a necessity, many people thus will try to minimise the total cost needed for their diet requirements. However, in modern affluent societies it has been found that sometimes products (included food items) sell, not because they are cheap, but because they are actually highly priced. Moreover, occasionally we get meals for free and then utility from such a meal will be higher than from the same one where we have to pay for it. In the following, the price of a meal will be referred to as p .

Algebraically, it can then be stated that an individual derives utility from food in the form of the characteristics offered by a meal, or:

$$U = f(\mathbf{m}_s^*) \quad [2.4.2.2.2-1]$$

where \mathbf{m}_s^* is the vector of the — individually different — utility spending characteristics, and which is the result of the consumer individual weighting process of the — objective — characteristics contained in a single meal \mathbf{m}_s . That is,

$$\mathbf{m}_s^* = \mathbf{P}^i \mathbf{m}_s \quad [2.4.2.2.2-2]$$

where the individual preference matrix \mathbf{P}^i , and the utility spending characteristics vectors \mathbf{m}_s and \mathbf{m}_s^* of a single meal are defined as follows:

⁷³There might be some exceptions where the time spent on a meal may actually increase a meal's total utility, e.g. when someone has to wait for a train or a flight and prefers to spend this time in a restaurant or coffee shop (i.e. in situations where not eating, i.e. not making use of a convenient opportunity, would actually lead to opportunity costs for later activities).

$$\mathbf{m}_s^* = \begin{bmatrix} c_s^* \\ \theta_s^* \\ \xi_s^* \\ \psi_s^* \\ \phi_s^* \\ p_s^* \\ t_s^* \end{bmatrix}, \quad \mathbf{P}^i = \begin{bmatrix} \omega_c^i & \omega_{c\theta}^i & \omega_{c\xi}^i & \omega_{c\psi}^i & \omega_{c\phi}^i & \omega_{c_p}^i & \omega_{c_t}^i \\ \omega_{\theta c}^i & \omega_{\theta}^i & \omega_{\theta\xi}^i & \omega_{\theta\psi}^i & \omega_{\theta\phi}^i & \omega_{\theta_p}^i & \omega_{\theta_t}^i \\ \omega_{\xi c}^i & \omega_{\xi\theta}^i & \omega_{\xi}^i & \omega_{\xi\psi}^i & \omega_{\xi\phi}^i & \omega_{\xi_p}^i & \omega_{\xi_t}^i \\ \omega_{\psi c}^i & \omega_{\psi\theta}^i & \omega_{\psi\xi}^i & \omega_{\psi}^i & \omega_{\psi\phi}^i & \omega_{\psi_p}^i & \omega_{\psi_t}^i \\ \omega_{\phi c}^i & \omega_{\phi\theta}^i & \omega_{\phi\xi}^i & \omega_{\phi\psi}^i & \omega_{\phi}^i & \omega_{\phi_p}^i & \omega_{\phi_t}^i \\ \omega_{p c}^i & \omega_{p\theta}^i & \omega_{p\xi}^i & \omega_{p\psi}^i & \omega_{p\phi}^i & \omega_p^i & \omega_{p_t}^i \\ \omega_{t c}^i & \omega_{t\theta}^i & \omega_{t\xi}^i & \omega_{t\psi}^i & \omega_{t\phi}^i & \omega_{t_p}^i & \omega_t^i \end{bmatrix}, \quad \mathbf{m}_s = \begin{bmatrix} c_s \\ \theta_s \\ \xi_s \\ \psi_s \\ \phi_s \\ p_s \\ t_s \end{bmatrix}, \text{ with:}$$

c = calories, θ = taste, ξ = health, ψ = status, ϕ = environment, p = price, t = time, and the ω_x^i , $x \in [c, \theta, \xi, \psi, \phi, p, t]$, are the individual "own" weights with respect to each characteristics, and the ω_{xy}^i , $x, y \in [c, \theta, \xi, \psi, \phi, p, t]$ and $x \neq y$, are the individual "cross" weights, which indicate complement (when positive) or substitute (when negative) relationships between the individual characteristics.

The characteristics, chosen here, may look like an *ad hoc* selection, but they are coherent with the relevant literature. Moreover, for this model the number of the characteristics included does not really matter, and others could be added without problem. The only consequence would be that the more characteristics that are incorporated in the model, the more difficult it may become to determine the utility maximum. The chosen characteristics can be seen as factors representing a whole set of variables. For example, the health factor may summarise many contributing effects from the different nutrients; and the environment vector may contain food production features such as animal health as well as the (non-) use of pesticides, etc. Important is, however, that in the following it will be assumed that these characteristics factors are independent of each other, i.e. their cross weights ω_{xy}^i are assumed to be all zero. That is, there are no substitution or complement effects between these characteristics, and thus \mathbf{P}^i simplifies to

$$\mathbf{P}^i = \begin{bmatrix} \omega_c^i & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \omega_{\theta}^i & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \omega_{\xi}^i & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \omega_{\psi}^i & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \omega_{\phi}^i & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \omega_p^i & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \omega_t^i \end{bmatrix}. \quad [2.4.2.2-3]$$

The remaining own-weights ω_x^i , $x \in [c, \theta, \xi, \psi, \phi, p, t]$, can take any positive or negative value, including zero, depending on the individual preference structure. Thus, people who do not care much about environmental concerns in food, will have ω_{ϕ}^i equal to zero. An average food consumer will have positive (or partly zero) weights, apart from the price and time characteristics. These two may, as argued above, represent overall utility decreasing rather than increasing aspects of a meal, thus in general ω_p^i and ω_t^i will be negative.

The simplification of the preference matrix has important consequences for the underlying utility function. In traditional microeconomic consumption theory utility is defined over market goods, which

are assumed to be substitutes for each other. That is, consumers are, in principle, indifferent between individual goods and choose the optimal consumption level of a pair of goods according to their marginal utility / price ratios.⁷⁴ However, in this new model, utility is defined over independent characteristics, which cannot be substituted for each other. Thus, there is no indifference relationship between them. That is, one cannot trade calories against e.g. environmental concerns, although the latter for some people may be unimportant. The point is however that utility resulting from environmental aspects may "top up" the utility derived from the calorie contents of a meal. In the traditional theory, utility cannot be increased further, once the efficient goods combination has been realised, unless income rises or prices fall. In the new model, even with income remaining the same, and two — otherwise identical — goods having the same price, utility will be higher when one good offers a non-monetary characteristics (an "externality") such as a superior taste, a higher status value, or the advantage of being produced in an environmentally-friendly way. The advantage of such an 'adding-up' concept of the 'part utilities' derived from individual characteristics is that total utility can be defined as a linear function. This makes the maximisation process easier. Furthermore, it must be considered that, in general, people consume more than one meal a day in order to meet their energy (and other nutrient) needs. That is, the full utility of food consumption — which in very basic terms means to assure life, as without food anybody would die within 40 days or so — is only reached with d food (included drinks) intakes a day. Thus, daily total utility derived from food consumption can be defined algebraically as the sum of the part utilities derived from each characteristics contained in each meal (or other food/drink intakes) consumed during the day, or

$$U(\sum_{s=1}^d \mathbf{m}_s^*) = f(\sum_{s=1}^d c_s^* + \sum_{s=1}^d \theta_s^* + \sum_{s=1}^d \xi_s^* + \sum_{s=1}^d \psi_s^* + \sum_{s=1}^d \phi_s^* + \sum_{s=1}^d p_s^* + \sum_{s=1}^d t_s^*). \quad [2.4.2.2.2-4]$$

The time horizon for this utility function, however, is not limited to the period of one day. This is for two reasons. First, even calorie intakes, as the most time-critical variable, can be stretched over a few days, although most people, in general, will have regular meals every day. That is, one will not lose much utility deriving from calorie intake, if there is a day without food, as long as this energy loss will be recaptured during the following days. Second, all the other variables are clearly less time-critical. Even if most people have their own taste requirements, i.e. a preference for certain foods, they will eat other (not so favourite) dishes in situations where choices are limited, without losing much (taste) utility, as they can re-compensate later on. Thus, during a longer period — maybe a month or so — there may be a minimum amount of their favourite tastes they want to consume. From this follows in return that when do people not have the opportunity to re-compensate within this period, they may loose utility and eventually deviate from their optimum long-run utility levels. A similar reasoning can be applied to the variables ξ , ψ , and ϕ . Consumers may have — within a certain longer-run period — minimum consumption requirements of the — abstract — characteristics of health, status, and environment proprieties of food, but they will not need to consume them with every meal or even every day. For the variables p and t the time restrictions are more conventional and easier to identify. The sum of the expenditure on the individual meals must stay within a certain (let's say monthly) budget determined by income (or savings) of a consumer. The total time needed

⁷⁴ That is, the marginal rate of substitution U_1/U_2 between good 2 and good 1 (i.e. the negative of the slope of the indifference curve) must equal P_1/P_2 (i.e. the negative of the slope of the budget constraint). Algebraically, $\frac{U_1}{U_2} = \frac{\partial U / \partial X_1}{\partial U / \partial X_2} = \frac{P_1}{P_2}$ (see TOUMANOFF & NOURZAD 1994, Chapt. 9).

for food consumption (maybe within a week) is likely to take an upper limit too for many consumers, although there may be differences depending on the day. For example, a weekday's breakfast may have a different time frame than a weekend's one. In more detail, the following restrictions on the utility function can be specified.

Energy constraints depend on gender, age, and the level of physical activity during the day. In general, the United Nations recommend 2100 calories a day as a minimum to sustain life without allowing for work or play. This is less than the 2300 calories that the US Agency for International Development uses as a threshold level to determine food aid needs (MEADE & ROSEN 1996). Moreover, there is some discussion as to whether people can adapt their energy requirements to their environment, where "adaptation includes shorter-run adjustment to variations over time in energy intakes and expenditures around unchanging means (homeostatis) and longer-run adjustments to changes in the means through changes in body weight" (BEHRMAN & DEOLALIKAR 1988, p.655). Thus, it is not completely clear if there is a single 'universal' minimum calorie level equal to all humans, or whether this level is — more realistically — determined individually. The existence of such a lower minimum level for every human is the main reason why all people derive utility from food consumption: food energy assures life. Thus, there is a minimum base level that needs to be reached, and the individual weight ω_c^i in the preference matrix \mathbf{P}^i can never be zero. On the other hand, in modern societies there is also a maximum calorie level that many weight-watching consumers may not want to exceed, unless perhaps on special occasions. But even then, one day of excess calories will be probably followed by a diet day, and therefore average daily calorie intake should be fairly stable. In order to incorporate these restrictions into the model, two critical values will be specified:

C_{\min}^i refers to the daily individual minimum calorie level needed to assure life, and C_{\max}^i to the daily maximum calorie level, determined by personal choice.

Taste considerations for food choice have been found to be important for most consumers. For example, PIERSON & ALLAN (1994, p.70) argue that "food marketers frequently rank taste as the most important consumer attribute. ... In this indulgent society, when foods taste good enough, they may be eaten regardless of their nutritional shortcomings. For most people, taste and flavor is paramount." This view is supported by VON ALVENSLEBEN (1997, p.213) who argues that "In every society we find a basic desire to enjoy food." However, at the level of the individual consumer, there may be large differences with respect to the value individuals put on this characteristics.⁷⁵ Thus, the individual weight ω_θ^i can take large positive values as well as zero. Even negative values are imaginable, in situations where people are forced to eat food, despite not liking their tastes. An example for this would be, when people under the threat of starving to death start to eat insects or reptiles. Clearly, although these "foods" may provide the same amount of life saving calories, people would be better off if they had better tasting alternatives available. On the other hand, there can be large differences in how different people judge the taste of the same foods and therefore these differences must be explained by differences in the preference matrix \mathbf{P}^i instead of being rooted in the 'objective' attributes of a single food or a meal, i.e. in the vector \mathbf{m}_s . Thus, the taste

⁷⁵ STIGLER & BECKER (1977) suggested that tastes are stable over time and similar among people, and showed that differences in the choices that people make can be related to different amounts of "human capital" that they accumulate over time. This may be possible, but the consequences of assuming different capital stocks or different tastes are in fact the same: people do make different choices even when having the same incomes and facing similar product prices.

characteristics of available foods (meals) can also *decrease* the overall utility derivable from food consumption. For consumers, whose taste weight ω_{θ}^i is non-zero, there will thus be a minimum amount of taste utility that they may want to reach within a given period. The length of this period may differ between consumers, as may the total amount of their "taste needs". In the following, this total amount will be referred to as θ^i .

Health aspects (including food safety) of food consumption have an objective and a subjective component. On the one hand, there is clear scientific evidence that food is more than just energy intake.⁷⁶ The human organism needs different nutrients, substances which are necessary for growth, development, and performance. Different foods contain different amounts of essential nutrients such as carbohydrates, fats, proteins, vitamins, and minerals. Different people have different needs of these nutrients, depending on gender, age, and the level of physical activity. Thus, it is obvious that different diets fulfil these different nutrient requirements only to different degrees. That is, some diets are more "healthy" in this respect than are others. However, on the other hand, there is considerable discussion on the "real" health consequences of malnutrition. Nutrition is only one factor among many that influence human health and the interactions between the different determinants are complex and numerous (see BEHRMAN & DEOLALIKAR 1988). Moreover, nutritional health effects are mostly long-run which makes the assessment of the impact of the health value of foods on the actual (mainly short-run orientated) food selection and buying process difficult. Nevertheless, for many consumers in today's affluent societies health considerations do increasingly matter. The time frame for the urge to consume "healthy" foods is difficult to determine and probably depends on the individual consumer, as does the total amount of this consumption. It is likely that the demand for healthy foods will vary over time, and e.g. it will be higher during periods of sickness. Moreover, as VON ALVENSLEBEN (1997, p.213) argues, health consciousness rises with age. In the following, the minimum level of 'health delivered through food' will be defined as Ξ^i , and the period in which people may want to consume this amount will be assumed as one year.

Status and prestige motives which influence food selection may clearly not be important for everyone. There is probably a strong positive correlation of this factor with income, but the variance at any point of this trend line may also be high, i.e. at any income level the weight ω_{ψ}^i in the individual preference matrix \mathbf{P}^i may take quite different values. Many other aspects — apart from income — may influence this factor, too. Culture, traditions, profession, psychological factors, etc. can affect the decision process which determines e.g. how often people choose a restaurant meal over a sandwich, invite guests for dinner parties, or buy champagne and caviar for New Years' Eve, instead of beer and potato chips. For example, VON ALVENSLEBEN (1997, p.215) argues that "people with low self-confidence tend more often to prestige consumption than people with high self-confidence, who depend less on the opinion of other people." Business people may regularly lunch in expensive restaurants with their business partners, and people in public life are sometimes characterised in books, magazines, etc. by the way and by what they eat. However, even "ordinary" people may put value on the status content of a meal. For example, MURCOTT (1986, p.124) argues that traditionally — in Anglo-Saxon societies — a proper dinner must be *cooked* and it must be "... taken at home, earned by the husband (father) and cooked by the wife (mother)", indicating

⁷⁶ See BENDER (1986), GORDON (1998, p.94-95), and SCHAFFNER *et al.* (1998, p.77-83), for some excellent overviews on this topic and a discussion of the "hard" research findings within the *inexact* science of nutrition.

that a different kind of dinner — maybe from a take-away, but equal in nutritional and taste proprieties — would not give the same amount of satisfaction, i.e. utility. Furthermore, image aspects are at the heart of any brand, and the food and drink industries are one of the most heavily-branded industries in the world (see JONES & MORGAN 1994). Thus, although hard to quantify, a total amount of "status quantity", which consumers may strive for to consume over, let's say a year, is introduced in the following model, and it will be referred to it as ψ^i .

Environmental, political and ethical concerns may be seen as relatively new issues which affect today's consumers in their choice of food products. However, the importance of these aspects has been growing rapidly. For example, in the US in 1995 organically-grown produce represented US\$3bn or about 9% of the US\$32bn produce retail market, and overall organic food sales doubled between 1990 and 1995 to reach about US\$8bn (GORDON 1998, p.97). Apart from this aspect, there are also increasing consumer concerns which are related to e.g. waste disposal, packaging, pollution, animal welfare and rights, worker safety and welfare, roles of advertising, forms of competition, prices and profits, and the wise use of energy (PIERSON & ALLAN 1994, p.74). In the following, all these different variables will be summarised into one single factor, as it seems likely that consumers who care about specific production methods will also be aware of related political issues, and thus the weight ω_{ϕ}^i in their individual preference matrix \mathbf{P}^i will be non-zero. As before, these concerns may be difficult to quantify exactly, but for the sake of the model, a certain — consumer individual — minimum level of environmental, political, ethical etc. 'quantity' will be assumed here which may be felt by some consumers to be consumed via food within a certain period of time. This minimum level will be referred to as ϕ^i , and as a time frame one year will be assumed.

Price and time constraints, finally, are more conventional. The sum of the expenditure spent on all purchased food items must stay within a certain budget, which is determined by either income or savings or both. Food can, however, also be given as a gift, in which case its consumption does not affect an existing budget; or it can be grown for personal use in individual gardens or on subsistence farms which even in some developed countries (e.g. the Mediterranean area) is not uncommon. In this case, food can be consumed at a much lower price, but the home production may involve higher time requirements. Time, in fact, can be seen as another major constraint for food consumption in modern societies, perhaps mostly because the opportunity costs of the time spent on it may have become higher. In highly differentiated and free societies the opportunities to use available time in the private as in the professional field for nearly anyone are manifold, and many consumers may want to make use of these options rather than to spend their time on long-lasting activities such as meal-planning, food shopping, in-home handling and storage, food preparation and serving, eating, and mealtime clean-up. On the other hand, some people may derive much utility from shopping, cooking and eating, as they may consider these activities as a better use of (non-working) time than e.g. watching TV, or playing cards or computer games, etc. In any case, available time for food consumption and accompanying activities will be limited for most consumers, and therefore a certain maximum level can be specified. As time frames for the budget and food consumption time constraints a month and a week will be assumed, respectively. The individual maximum values will be referred to as B^i and T^i .

The following optimisation problem can thus be specified which describes the food consumption problem that a consumer faces over a long-run period, here assumed as a year:

$$\text{Maximise} \quad \sum_{s=1}^y c_s^* + \sum_{s=1}^y \theta_s^* + \sum_{s=1}^y \zeta_s^* + \sum_{s=1}^y \psi_s^* + \sum_{s=1}^y \phi_s^* + \sum_{s=1}^y p_s^* + \sum_{s=1}^y t_s^* \quad \text{over a period } y \text{ (e.g. a year)}$$

Subject to:

energy constraints	$\sum_{s=1}^d c_s^* \geq C_{\min}^i$	and	
	$\sum_{s=1}^d c_s^* \leq C_{\max}^i$		over a period d (e.g. a day)
taste constraint	$\sum_{s=1}^w \theta_s^* \geq \Theta^i$		over a period w (e.g. a week)
health constraint	$\sum_{s=1}^y \zeta_s^* \geq \Xi^i$		over a period y (e.g. a year)
status constraint	$\sum_{s=1}^y \psi_s^* \geq \Psi^i$		over a period y (e.g. a year)
environment constraint	$\sum_{s=1}^y \phi_s^* \geq \Phi^i$		over a period y (e.g. a year)
budget constraint	$\sum_{s=1}^m p_s^* \leq B^i$		over a period m (e.g. a month)
time constraint	$\sum_{s=1}^w t_s^* \leq T^i$		over a period w (e.g. a week).

This maximisation process is different to a linear programming problem as two new aspects need to be considered. First, the inputs that enter into this model are not single units of the individual characteristics, but *bundles* (meals) of several combined characteristics coming in different quantities. That is, if someone wants to consume e.g. taste, this consumption will, in general, only come with a cost: the simultaneous decrease of the limited "stocks" of money, time, and calories. Thus, consumers almost always faces trade-off problems when deciding on a meal. Second, the different time frames of the individual constraints extend the choices for consumers (and for the maximisation algorithm). Food consumption is a continuous process (when seen over a longer period) and thus there is no single big allocation decision to make but many little ones. This implies that one decision often is influenced by a previous one or can affect a following one. For example, after a long dinner party people may not feel like having a big breakfast, and after a week of fast food, people may have a desire for something home-cooked. Therefore, the longer-run time limits imposed in the model mean that within a series of food intakes only some need to contribute to fulfil the restrictions and some do not, which increases choice. The actual technical optimisation algorithm will not be investigated in the following, as it would be beyond the scope of this introduction into the model. However, the next sub-section will discuss some important implications which can be derived from this model.

2.4.2.3 Implications for consumers and international food product marketers

The food selection process depends on (i) the individual preference matrix \mathbf{P}^i , and (ii) the individual needs $(C^i_{min}, \theta^i, \varepsilon^i, \psi^i, \phi^i)$ and resources (C^i_{max}, B^i, T^i) , and their time frames as expressed in the constraints. Both determinants are, however, connected, and a non-existent need implies a zero corresponding weight in the preference matrix. For example, for consumers who are not concerned about e.g. environmental externalities of food, ϕ^i and the corresponding weight in the preference matrix, ω^i_{ϕ} , will be zero. Yet people with no interest in the environmental aspects of food production may occasionally still consume e.g. organically grown food, i.e. products which are high in ϕ_s , but ϕ_s will not affect these consumers' optimisation processes, as their ϕ^i and ω^i_{ϕ} are both zero. This implies that people with simple preferences and needs, and not too restricted resources, face a much simpler optimisation problem. For example, imagine someone who derives utility from food consumption from calorie intake only. This utility must reach a certain minimum level (in order to assure life, as stated earlier). That is, there is a constant minimum utility \bar{C}^i_{min} . All other utility spending characteristics of food consumption are unimportant for this person, i.e. the weights $\omega^i_{\theta}, \omega^i_{\varepsilon}, \omega^i_{\psi}, \omega^i_{\phi}$ and the needs $\theta^i, \varepsilon^i, \psi^i, \phi^i$ take all zero values. Furthermore, this person allocates only minimum (i.e. small) money and time budgets B^i and T^i to food consumption, and he/she values each unit of time and money spent on it as strongly utility-decreasing, i.e. ω^i_p and ω^i_t take comparatively large and negative values. It is then clear that this person maximises utility derived from food consumption in minimising the sum of utility-decreasing characteristics, i.e. in choosing food products (or meals) that have low p_s and t_s contents. That is,

$$U = f\left(\sum_{s=1}^Y c_s^* + \sum_{s=1}^Y (-\omega_p^i \cdot p_s) + \sum_{s=1}^Y (-\omega_t^i \cdot t_s)\right) = f\left(\bar{C}^i_{min} - \sum_{s=1}^Y p_s^* - \sum_{s=1}^Y t_s^*\right), \text{ and } \max U(\cdot) = \min \left(\sum_{s=1}^Y p_s^* + \sum_{s=1}^Y t_s^*\right).$$

However, consumers for whom food is more than just "fuel" and who feel the need for additional utility from other characteristics offered by food — i.e. either one or some or even all of $[\theta^i, \varepsilon^i, \psi^i, \phi^i]$ and their corresponding weights in the preference matrix \mathbf{P}^i take non-zero values — the meal (or product) selection process will be more difficult. Then, the more aspects to be considered, the more complicated the decision (i.e. the optimisation process) will be. This may perhaps explain why in today's affluent societies, despite the enormous variety of different food products (and partly because of this), the basic human activity of eating seems to have become more complicated, as the emergence of social phenomena such as e.g. overweight problems, anorexia, vegetarianism, organic foods, food snobbism, etc. shows.

Different types of food consumers, as identified by GRUNERT *et al.* (1996) (see above) can be explained with the presented model as people who differ in their needs/resource structure and in their preference matrices. For example, "conservative" food consumers may be described as having comparatively strong taste requirements,⁷⁷ but the health contents of a meal may only be of little

⁷⁷ It should be noted here, that the presented model is still a rather aggregated one. 'Tastes' describe here only how important this determinant is relative to the other specified factors. However, it is still possible that two consumers who have the same *preference* for taste (as compared to the other determinants) will have completely *different* tastes and choose different meals. Both consumers, however, would choose these meals due to their specific tastes and not because e.g. these meals are the cheapest available or because they have special health or environmental properties. In order to allow for differences in taste in the model, the taste factor must be further disaggregated and special 'needs' for e.g. sour, sweet, spicy, salty tastes, soft and crunchy textures, desires for meat, vegetables, pastas, rice, etc. be introduced. Such a specification, however, would result in a much more complex model.

importance, and environmental aspects be rather unimportant. Furthermore, prices may be important within a certain range but time constraints may not be too restrictive (as GRUNERT *et al.* show that convenience products are rarely used by these consumers). "Hedonistic" food consumers, on the other hand, may be described as having strong preferences for taste and status, i.e. θ^i , Ψ^i , ω_θ^i and ω_ψ^i take all comparatively large values, but prices and time are less important, implying comparatively high B^i and T^i s and low (and negative) ω_p^i and ω_t^i s. Furthermore, the model can also explain very special food choice behaviour, e.g. that of children. Children behave differently from adults because they have different needs and because in their food selection decisions they usually don't have to take into account resource considerations such as prices or time, as they live with their parents. Moreover, at this age, status, health, and environmental concerns may be unimportant. The only aspects that may matter to children are to meet their energy requirements and taste (and in particular sweet tastes, see MURCOTT 1986, pp.119-122). Thus, their utility maximisation problem reduces to

$$\max \left(\sum_{s=1}^y c_s^* + \sum_{s=1}^y \theta_s^* \right) \text{ subject to } \sum_{s=1}^d c_s^* \geq C_{\min}^i, \sum_{s=1}^d c_s^* \leq C_{\max}^i, \text{ and } \sum_{s=1}^d \theta_s^* \geq \theta^i \quad \text{over a day.}$$

Therefore, considering this particular consumption situation, a child's typical choice to "not eat their beans and yet still be hungry for ice cream" cannot necessarily be seen a "violation of rational consumption behaviour" as e.g. RICHARDS *et al.* (1998, p.365) claim.

Increasingly similar food consumption pattern across countries can also be explained within the presented theoretical framework. As the selection of food (either in form of meals or food products) depends on the resource/needs vector, it should be clear that the more similar these vectors become the more similar the chosen foods will be. In societies where working patterns, ways to spend leisure time, shopping behaviour, etc. converge, and thus individual resources (in particular time constraints), and needs (body weight ideals and environmental concerns are cross-national anyway) become more similar, optimal food consumption patterns must become similar, too. Thus, converging food product markets can be explained as a result of increasingly cross-national similar, T^i and C_{\max}^i , the simultaneous increase of health concerns, Ξ^i , and the emergence of new environmental aspects in food production, Φ^i , in many consumers' food choice optimisation problem. Therefore, ever more similar food consumption patterns can be well understood as similar reactions to changes in the economic and social environment of consumers, more or less external to them.

Persisting national or regional food consumption patterns may be attributed to nationally or regionally different preference matrices \mathbf{P}^i . Even if the 'economic and social environments' have become more and more similar for many consumers in most industrialised countries, individual, regional or national preferences may not necessarily converge. For example, it may be rational for all consumers to switch from meats to vegetables in their eating habits, because vegetables may be more healthy, cheap, and low-calorie. But Germans may still prefer potatoes, Britons pumpkin, and Italians tomatoes, etc. Equally, a rise in the demand of dairy products in all countries does not necessarily mean that all consumers prefer exactly the same cheese or yoghurt brand, etc. After all, existing research results has only confirmed food consumption convergence within nutrients or broad commodity groups. For individual products the trend is far less clear (see above), which supports the argument well. Thus, given the large variety of foods, with many of them containing similar characteristics, there is still scope for a very individual meal (or food product) selection.

That is, even if two consumers are identical in their needs/resource vector and their preference matrices — which is not unlikely given the simple, i.e. aggregated specification of this model, and the high numbers of existing consumers — they may still end up with different diets (see however Footnote 77).

Food consumption in the 21st century, therefore, will still be a problem for many consumers, and maybe a bigger one than ever before. With income restrictions having become less binding, new aspects have emerged in the food consumer's decision process. The resulting trade-off problems are now more complicated as more aspects need to be considered in the food selection problem: typically an affluent society's food consumer wants to enjoy as much food as possible, yet to stay in a good shape and in good health, she/he still doesn't want to spend unnecessary time or money on eating and related activities, she/he may want to take part regularly in food-related social events, and even might want his consumption decisions to be in harmony with accompanying environmental, ethical or political concerns. Finding the "optimal" diet is therefore not only more complicated, the result is also likely to be more uniform. There are already research results that show that for example, given its outstanding convenience properties, consumers prefer pasta over potatoes or rice (RICHARDS *et al.* 1998), indicating that in the future only a limited range of food products (or particular meals) may be capable of fulfilling all of the modern food consumers' requirements. However, this scenario will become true only to the extent to which consumers understand the trade-off problems that come along with food consumption. However, the growing significance of diet related health problems (overweight, high blood pressure, heart and liver problems, anorexia, etc.) in many affluent countries seems to confirm, that "optimal" food consumption for large parts of the population is by far not yet reached. Thus, there should be scope for many supporting services in the food industries. In fact, there are predictions that the strongest growing segments of the food industries in the 21st century will be (i) ethnic foods, (ii) healthy and natural foods, and (iii) 'functional' foods (The Economist, April 15 2000, p.68). All these foods provide special proprieties with respect to taste and status (ethnic foods), health and environment (natural foods), or body weight and health (functional foods). Functional foods, in particular, as a high-tech combination of a food and a drug, are designed to minimise the nutritional trade-off problems that come along with "normal" food, and promise health benefits beyond what nutrients would normally provide, or special, calorie-free, taste sensations (e.g. fat-free ice-cream). The commercial success of functional foods, however, has been limited so far (The Economist, September 11 1999, pp.75-76), mostly because the promised effects are not always scientifically proven, and because these products suffer from image problems (poor branding), and are often very highly priced (*ibid.*). Thus, it seems likely that the solution for a modern consumer's diet problem may instead come from finding better combinations of already existing, 'traditional' foods.

Opportunities for international food marketers seem therefore manifold. Ethnic foods will be a growth segment in the otherwise stagnant food product market. However, it should be clear that a foreign dish or food product will only be accepted internationally if it offers proprieties which are perceived as superior over those offered by local food. This might be a better taste, a special health value, maybe a cheaper price, or simply status and image-related characteristics. In the context of the presented model, a food product (or a meal) is superior to another one if the sum of the part utilities of its characteristics is higher relative to the (at this particular choice situation) binding utility-decreasing characteristics, i.e. the sum of the θ_s^* , ξ_s^* , ψ_s^* , ϕ_s^* values of a meal (or a single food product) per c_s^t , t_s^* or p_s^* is higher than the ratio offered by locally produced food alternatives. For example, it may be argued that "Asian" food, in

general, is as quick to prepare as other non-Asian fast foods, but it is not significantly more expensive, it offers a more intensive taste (perhaps due to its spice contents) and maybe in health quality (as it is in general low in fat and meat, and rich in vegetable and complex carbohydrates (rice)). More specific, the worldwide growing popularity of Japanese sushi may be explained by its high content of health properties (low fat, low calorie) combined with its high status value (it is very *chic* at the moment), thus making it a perfect food for all who have to eat often in restaurants and who can afford its high price (e.g. business people or affluent individuals). German bratwurst, on the contrary, may be seen as another fast-food which is cheap and quick to prepare, but it is also low in health and status properties, thus, not surprisingly, it has not become a worldwide accepted food. Therefore, one aspect that determines the success of a particular dish in international markets is its *relative* content of actually utility-spending characteristics it offers to consumers. However, this may only be a necessary condition for the acceptance of a new food in a foreign country, yet it may not be sufficient to make it also a household success such as e.g. pasta, pizza, curry dishes or hamburgers. In order to get people to prepare foreign dishes also at home, and thus to *buy foreign food products* rather than restaurant or take-away meals, other factors must be fulfilled, too. To understand what makes the difference, it is useful to regard a (foreign) meal (cooked at home) as a vector of many different ingredients, but which can be simplified into a vector with just two input components, i.e.

$\mathbf{m}_s = \begin{bmatrix} i_f \\ i_h \end{bmatrix}$, where i_f and i_h stand for ingredients produced in a foreign country and for those produced at

home, respectively. It could be argued now that a foreign food will be successful if it *complements* foods that are already eaten in a country, which means that by combining i_f and i_h to a new meal, the sum of its part utilities resulting from its now changed characteristics can be higher. For example, SCHAFFNER *et al.* (1998, p.67) argue for the US food market that "Thai food's ultimate success at the grocery store will depend on how well it complements cuisine Americans already eat. ... Mexican food would not have taken off if it had not been a new way to cook ground beef." In fact, the overwhelming success of pasta dishes or pizza in many countries of the world may be explained by the fact that it is possible to use many local ingredients for the preparation of these dishes and the result will still have an Italian flair.⁷⁸ Therefore, if ethnic cuisines offer a new way of cooking already available foods, and this new combination of ingredients offers a better mix of utility-spending characteristics — which allow the food consumer to better maximise his food utility function — a new dish is likely to become a cross-country success.

Food product marketers need to understand this modern 'food consumption mechanics' and find ways to help the consumer to solve her/his food utility maximisation problem. They can do so in e.g. providing foods that are high in one single utility-increasing characteristic and, ideally, low in utility-decreasing ones. Such foods, in minimising trade-off problems, would allow the consumer to better "fine-tune" his/her selection process, and to reach a higher overall utility level. Ingredients such as e.g. widely-traded spices or olive oil, which is now very popular all over the world, may be a good example, because they allow to add 'taste' or 'health' to a dish according to individual preferences. Drinks (e.g. soft-drinks, fruit juices, wines or beers, coffee, teas, etc.), are internationally successful products, too, which allow food

⁷⁸ In fact, a research project launched by the US Army Natick RD&E Center in the early 1990s on the determinants of the acceptance of ethnic food showed that new unknown food is more likely to be accepted if it is similar to one that people already know and which are well-liked. That is, familiar products serve as a kind of bridge to the new product. Moreover, the acceptance has been shown to be significantly higher if the novel food product is introduced with sufficient accompanying information on e.g. ingredients, proper use, origin or cultural background (ITKONEN 1999, p.16). Thus, real new foods, i.e. those that are not just new combinations of already familiar foods, are indeed much more difficult to sell successfully in a foreign market.

consumers all over the world to increase the utility derived from a meal, as meal-accompanying drinks add further characteristics (e.g. taste, nutrients, stimulation, status, etc.) that can be consumed according to personal preferences. French champagne is a particularly successful example. Although not offering very much different properties such as taste or health than e.g. comparable — but much less exported — German sparkling wine, the champagne's high contents in status value has made it an internationally highly demanded product, despite its higher price. (This is also because it offers more overall utility per calorie — due to its higher status properties and other things being equal — in particular for people who care more about body weight than price.) On the other hand, it is obvious now, why e.g. pre-cooked ready-to-eat meals, in general, must be adapted specifically to local tastes. Within a limited geographical area, individual food preference matrices \mathbf{P}^i may be quite homogenous. Thus, a particular dish, which is appreciated by many in this area, can be optimised according to these homogenous preferences in order to deliver the optimal mix of utility-spending characteristics. However, as soon as preferences change, a standardised dish may no longer be optimal for the individual utility maximisation process, and therefore successful international marketing of regional dishes becomes difficult. On the other hand, modern, industrially-produced, internationally-successful, and usually highly-branded food products such as e.g. confectionery products, soft-drinks, beers, instant coffee, breakfast cereals, etc. may be seen as products which are very useful for consumers to supplement existing needs and which offer dominant characteristics such as specific tastes (confectionery), special status/prestige proprieties (drinks) or particular convenience advantages (instant coffee or breakfast cereals). Therefore, in the future, food products must be tailored even more specifically to support a consumer's food utility maximisation process. As in particular health and environmental (ethical, political, social, etc.) concerns are predicted to become more important for modern consumers' food selection decisions, international food product marketers must be prepared to review their existing product ranges.

The practical relevance of the presented model needs to be stressed, too. Relevant food product (or meal) characteristics can be identified empirically and preferences can be measured. *Conjoint analysis*, a modern multivariate data analysis technique,⁷⁹ can be used for the identification of the relevant characteristics offered by a food product (or a meal), i.e. \mathbf{m}_s , and the individual preference matrix \mathbf{P}^i . To identify relevant characteristics of a meal or a food product, a large sample of consumers need to be surveyed on the characteristics of a particular food and the mean of all responses will give the "true" contents of relevant characteristics. Consumer-individual deviations from this mean should then reflect adequately individual preferences. Systematic differences across geographical areas in the aggregate values of perceived characteristics of a single meal or a food product may represent cultural influences within the preference matrices. Knowledge of area-specific differences in preferences should make possible predictions of how successful a particular product could be marketed within a foreign country.

⁷⁹ see HAIR *et al.* (1998, Chapter 7) for an introduction to conjoint analysis.

2.4.2.4 Summary and conclusions

This section discusses some current topics in international food consumption, which are important for international food product marketers: international convergence in food consumption, persistent regional consumption pattern, and the existence of cross-national similar types of food consumers. Then, after revising traditional economic approaches to explain consumption behaviour, a new modelling approach is proposed. Based on this model, some important implications for consumers and international food marketers are derived which affect food consumption in the 21st century.

Aggregate food consumption has been shown to converge in many industrialised countries, implying that diets are becoming increasingly similar. Yet, at the same time, it has also been shown that strong regional food consumption patterns persist. This apparent contradiction can be explained in two ways: (1) a large part of consumers in a country eat increasingly internationally similar diets, whereas another large part of a national population continues to consume traditional food. This view is supported by the empirical finding that similar types of food consumers across countries exist which — to very different degrees — accept new foods and new food consumption habits. (2) Another possible explanation for increasingly similar diets is that most consumers of a country adopt new foods and eating habits, but only on certain occasions, whereas at other times they still prefer their regional foods. In order to gain deeper insights in these developments, and to see how these trends affect international food product marketers, a better understanding of consumption behaviour is needed.

Traditional microeconomic consumption theory describes how rational consumers should allocate their expenditures between goods in order to reach a utility maximum. In assuming income as the actual binding limiting factor in consumers' choice, the optimum condition then proposes to choose the quantities of two goods in a way that, at the margin, their utility/price ratios equal each other. *LANCASTER's consumption theory* argues that product characteristics spend utility, rather than market goods. In order to maximise utility, a consumer selects a specific bundle of market goods in a way that allows him to consume her/his preferred combination of characteristics. Given the conventional budget constraint, consumption will then be efficient when a consumer chooses the cheapest of otherwise identical such bundles. This model expands the traditional approach of modelling the consumer's decision making process to the world of differentiated goods. *Household production theory* incorporates time in the consumer's decision problem. It argues that (non-market) Z-goods are the real utility-spending entities. These Z-goods need to be produced by the households, using market goods and time for the transformation process. Thus, a budget and a time constraint need to be considered by a consumer when selecting goods in order to maximise utility. Both constraints can however be transformed into a single one, using a consumer's wage rate. This wage rate enables the calculation of a shadow price for the time requirements in the production of a Z-good. The optimum condition then implies to equalise the ratio of the marginal utility of two Z-goods to the ratio of their marginal costs, however, the latter supplemented by the shadow prices of their production times.

A dynamic concept of utility derived from food consumption over a longer-run period can be specified in assuming that utility from different characteristics is accumulated over time. There is a base utility from calorie intake, which is equally important to all consumers as it assures human life. Other part utility may come from other characteristics of food consumption, such as its taste, health, status or environment contents. These attributes may not be equally important for all consumers, but if they matter they increase overall utility. There are, however, also utility-decreasing characteristics that come along with food consumption. Modern food consumers may want to keep a certain body weight, thus the calorie contents of food constrains their food choices. In addition, food consumption takes time and money, and, by choice or out of necessity, many consumers may want to limit the total amount of time and money spent on eating and accompanying activities. All of these constraints have certain time frames. Food needs to be eaten regularly, thus calorie intake must take place within short periods. Taste or health proprieties of food may also be desired by many people to be consumed on a regular basis. Status aspects or environmental concerns may perhaps not be important at every meal, but over a certain period there may exist — individually different — minimum consumption requirements. Another important aspect in food consumption is that food is usually consumed as meals, i.e. as bundles of many different foods and drinks. This implies that utility affecting characteristics offered by a meal come in fixed proportions. Although the characteristics, and their amounts, offered by a meal should objectively be the same for all consumers, personal preferences, which are affected by gender, age, culture, income, social status, etc., lead to the objective vector of characteristics being transformed (by a weighting procedure) into an individual one. Yet even then the different characteristics will come in fixed proportions which makes utility maximisation difficult since it causes trade-off problems. Thus, in the long run, a consumer will choose food products which allow him best to maximise his aggregate utility, in accumulating as much as part utility as possible, until the first binding constraint (maximum calorie intake, monetary expenses or time requirements) is reached. The different time frames of the constraints allow for some choice between individual meals as not all restrictions need to be met at any meal. However, subsequent food choices may then be affected by the food chosen before. The better the combination of foods chosen over a period, i.e. a diet composed of meals that offer much of utility-increasing characteristics relative to the most restrictive utility-decreasing one, the higher the overall utility will be at the end of the period. The more relevant the characteristics which affect the decision process the more difficult the food selection process will be.

Implications that arise from this theoretical framework are: (1) converging international food consumption can be explained as a reaction to increasingly similar social and economic environments in many countries; (2) individual preferences may be homogenous within geographical areas but different across them which causes regional food consumption patterns to continue to exist despite international pressures for more similar eating habits; (3) regionally different preference matrices of consumers make it difficult to market regional dishes successfully internationally; (4) internationally successful dishes and food products are those that offer a high content of one or two distinctive utility-increasing characteristics relative to a relevant, i.e. binding, utility-decreasing characteristics, which may be price, time requirements or calorie contents; (5) foreign food products are more easily accepted by a local population when they help to transform already existing and well-appreciated food products into a new meal which offers a better mix of utility-increasing characteristics. For food product marketers it is important to understand these implications if they want to operate successfully in international food product markets in the 21st century.

The practical relevance of the presented model is that it can be made operational. Using e.g. *conjoint analysis* — a multivariate statistical technique — it is possible to determine the content of product (or meal) specific relevant characteristics as the mean values of survey results from a large number of consumers. Consumer individual deviations from these mean values then reflect individual preferences. Regionally similar patterns of deviations from the aggregate mean would indicate area-specific food consumption preferences. Knowledge of these area-specific preferences and of the characteristics contents of a product or a dish should then allow for accurate predictions of the marketability of a food product in a foreign market.

2.5 Chapter conclusions

International trade in food and drink products is complex in nature and thus the application of one single theoretical framework which would be able to explain this kind of trade is difficult. Rather, depending on the nature or kind of the food product, different concepts need to be applied. Overall, however, as food and drink items are consumer products it seems clear that this kind of international trade is explained best from the consumers' point of view, rather than from the production side on which standard international trade theory is usually based. Table 42, which follows at the end of this section, summarises the chapter findings. It focuses on differences between the individual food groups. In addition, the expected trade patterns are given. Corresponding explanations and justifications for this expectations have been presented in the previous sections. The main conclusions for the individual food and drink product categories are as follows.

World trade in agricultural commodities has been extensively analysed in the past. This analysis has generally rested on the traditional theory of comparative advantage resulting from differences in either factor productivity or factor endowments (that may also include climatic and geological conditions), and which assumes perfectly competitive markets where the goods sold are homogenous and produced under a technology of constant returns to scale. This study, however, has not focused on international commodity trade.

World trade in perishable foods, in general, may also be explained within the framework of comparative advantages, although branding can be important for some goods (e.g. bananas or special meat varieties, such as Angus, Aberdeen or Charolais beef). In fact, it would be possible to classify perishable foods into the group of agricultural raw commodities but they are distinct in at least two ways: (1) they are ready for final preparation/consumption, and (2) until recently — due to their perishable character — these products were difficult to store and transport. Thus logistics clearly plays a role in this kind of trade and comparative advantages may therefore not only include production but also marketing skills, i.e. the creation of appropriate transport and storage capacities.

The international trade of high-value foods may be as difficult to explain with a single theory as it is for food as a single group on the whole. The reason for this is that undifferentiated agricultural/aquacultural commodities such as crayfish, asparagus or strawberries belong to the high-value group as well as highly-branded and industrially produced products such as expensive chocolates or beer. Whereas a

nation that has comparative advantage in shrimp farming or in growing strawberries will probably end up as an exporter of these products, it is less clear why a trendy Mexican beer brand has more international success than traditional German breweries with sometimes century-long production experience. However, as prices in international food trade are only one factor affecting success, focusing on market value for analysing international market success is not enough. Non-price factors clearly influence the international success of these food and drink products, in particular as they are mostly bought by affluent consumers who are clearly sensitive to other product aspects as well.

International trade in processed foods is also complex since these products can be either undifferentiated final consumer goods or ingredients for food preparation in the food and drink industry. Examples may be items such as raw sugar, cream or flour which are commonly used as ingredients but which can also be marketed internationally as highly differentiated and branded products, such as Demerara tea sugar, (Australian) King Island Cream or French Crème Fraîche de Normandie, or Italian durum wheat flour for making pasta at home. For ingredients, prices and production cost and therefore comparative advantages in production may be crucial for success in international markets. However, non-price factors, such as attributes related to the product itself (quality, packaging, taste, etc.) or services offered with the product ("send it back if not satisfied"), and marketing skills of the distributor may be more relevant for the international marketability of final consumer products.

World trade in culturally-bound manufactured food and drink products may be especially particular in nature. This study has suggested that at least part of this kind of trade may follow international migration and tourism flows, since immigrants and tourists may create a demand for these products in their host countries and their home countries respectively. Moreover, immigrants and tourists may serve as catalysts for the creation of additional demand of foreign food and drink products in the native populations. Empirical evidence for the case of Germany could largely confirm these effects. However, a more detailed analysis, including different countries and more products, would be necessary in order to identify which ethnic groups do actually engage strongly in this kind of trade and which products are most likely to belong in the category of those internationally unique products which apparently cannot be substituted by local products and are thus traded globally.

Industrial food and drink products seem to be produced and distributed mainly by large multinational companies, contrary to the very often small local enterprises which manufacture traditional food products for local markets. As a consequence, foreign direct investments (FDI) seem to occur mostly in the industrial food group. Since the large international food and drink companies hardly produce traditional, culturally-bound foods, they are able to access foreign markets more easily and to create demand for their 'cultural unproblematic' products with their highly developed marketing skills. This may explain why the majority of small and medium-sized food producers are not equally successful internationally than most of the large multinationals are.

Table 42: How product determinants affect international food and drink product trade

	Food category				
	<i>Agricultural raw commodities</i>	<i>Food products</i>			
		<i>Perishable goods</i>	<i>Processed foods</i>	<i>Manufactured foods</i>	<i>Industrial food products</i>
Examples	Grains, oilseeds, raw coffee & sugar, live animals	Fruit & vegetables, fresh meat & fish	Dairy products, flour, oat flakes, pasta, jam, juice & wine, bottled tomatoes	Bread & bakery goods, tinned soup, prepared pasta sauces, deep-frozen pizza, fish preparations	Soft drinks, beer, chocolate, confectionery, breakfast cereals, instant coffee, stock cubes
Main features	Undifferentiated bulky goods; price most important criteria	Fresh & unprocessed; difficult to transport and store	Separation of edible from not edible parts, therefore plants are often located near agricultural production	Blend of different ingredients. Product composition may depend on local taste and tradition. Therefore difficult to market elsewhere	Products cannot be produced by households. Products can be designed for international tastes and uses
Share of agricultural input value in final product price	high	high	medium	medium to low	very low
High-value	no	yes	dependent on raw material and processing method	yes	yes
High value-added	no	partly through branding	dependent on processing methods	yes	yes
Product differentiation and branding	rarely	partly	often	very often	nearly always
Significance of non-price factors	unimportant	partly important	partly important	important "culturally-bound"	important
International trade mainly driven by	Comparative advantages in production	Comparative advantages in production <i>and</i> marketing	Comparative advantages in production & demand conditions	Demand conditions; Some products may follow international migration & tourism	Trade mostly substituted by foreign production
Expected trade pattern	Inter-industry	Inter-industry	Intra-industry	Intra-industry; trade follows people movements	Foreign direct investment

Source: Author's compilation.

3 MANAGING INTERNATIONAL FOOD PRODUCT TRADE AT THE COMPANY LEVEL: THEORY, AND RESULTS FROM A SURVEY OF INTERNATIONAL FOOD PRODUCT MARKETERS FROM GERMANY AND AUSTRALIA

The following part of this study investigates the problems involved in the management of international marketing activities of food products from a single company's perspective. For this, first, the theoretical foundations of the management of international marketing transactions of food products will be presented. Then relevant empirical studies will be discussed which have already been conducted, and which investigate the problems involved in these activities in a variety of countries. After this, the results of a survey of German and Australian companies engaging in international food product marketing activities will be presented. The survey aims to explore the problems encountered in international food product marketing, and which have not been much investigated before in this manner. Finally, some conclusions will be drawn from the research findings.

3.1 The theory of international food product trade management

A definition of international management is provided by O'CONNELL (1999, p.177): "the process of planning, staffing, organising, and controlling international business activities", where *international* business refers to activities that are carried out across national borders including "import and export activities, trade in services, consulting activities, and any other business related endeavours which cross a nation's borders" (*ibid.*, p.169).⁸⁰ In the following, however, the focus will mainly be on export and import management, although the other activities will also be described briefly.

The international food product business adds further, mostly product-specific, challenges to the management process, such as e.g. a complex logistics due to the perishable character of most food products. Moreover, food products are, as argued before, "culture-bound" goods which makes international marketing activities of these products difficult, due to the existence of regional or national tastes and preferences (see Section 2.4.2).

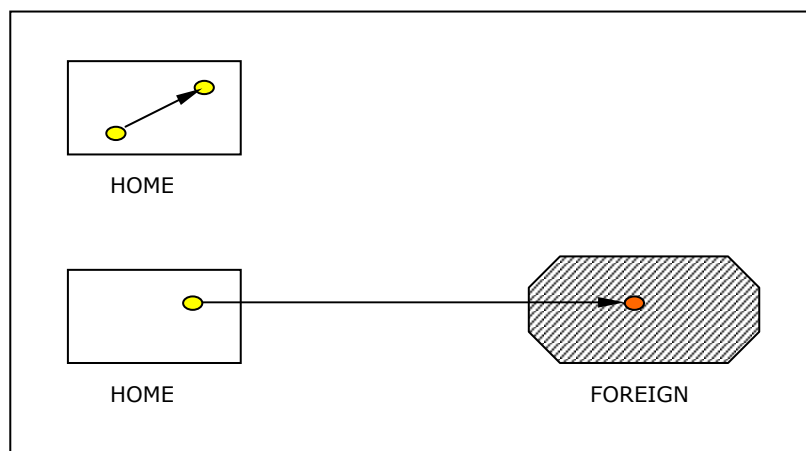
⁸⁰ *Management* in general can be defined as the activity of achieving change in one's material and/or human environment in order to create financial or non-material value. This definition thus includes conventional business management, but also non-commercial forms, such as e.g. the management of expeditions etc. The successful completion of a change process usually requires the following skills: (i) the identification and formulation of goals and the figuring-out of a way to achieve them (demanding vision & *strategy* formulation), (ii) a detailed *planning* phase, (iii) the make-it-all-happen (i.e. the *realisation* process which demands technical skills such as a deep understanding of the mechanics, i.e. the economics of a process, together with skills in handling humans, such as a understanding of psychology, that is organisational behaviour), and (iv) the *controlling* of the change process. In addition, (v) effective *communication* skills may be necessary during the whole process, as convincing all involved persons of the importance and necessity and quality of the achieved results of the process may be equally important for its overall success than the actual realisation of its goals.

3.1.1 Managing food product trade — theory and previous research findings

3.1.1.1 Theoretical foundations

International commercial exchanges of good and services are in general more complex to manage than domestic business deals. This is a consequence of the usually greater physical distance between two business partners and the different business environment in which they may operate. Figure 17 can be seen as a simple model that illustrates the principal differences between domestic and foreign business operations.

Figure 17: A model of export complexity (home market transactions versus exports)



Source: Author's draft

The foreign business complexity is a result of (i) higher transaction costs, and (ii) increased commercial risks that are involved in foreign market operations. The perishable nature of food products increases both transaction costs and involved risks (JAFFEE & GORDON 1993). Furthermore, both factors determine the entry strategies that a company may typically choose for serving a foreign market.

Transaction costs — i.e. the whole array of costs associated with buying, selling, and transferring ownership of goods and services⁸¹ (JAFFEE & GORDON 1993, pp.8-9) — are higher in international business due to (i) the physical distance to the foreign market, and (ii) the generally different business environment, i.e. the economic, legal and/or cultural aspects that characterise foreign markets. Large geographic distances between trading partners increase the logistical problems of transport and storage. This is in

⁸¹ *Transaction costs* include in particular: (a) the information costs incurred in identifying and screening different trading opportunities, outlets, and partners, (b) the costs of negotiating exchange agreements, (c) the costs of actually transferring goods, services, money, and ownership rights, (d) the costs of monitoring trade conditions to determine whether the agreed terms are complied with, and (e) the costs of enforcing stipulated terms through legal, social or other means (JAFFEE & GORDON 1993, p.9). *Transaction costs* take numerous tangible forms, including: travel costs, personnel time, communications costs, insurance costs, advertising and promotional costs, transport and storage costs, market research and consulting cost, arbitration, legal, and auditing costs, financial and other costs from delayed payments or delayed procurement, the cost of credit rating checks and product inspection services, costs incurred in safeguarding property, and actual losses from stolen goods, etc. (*ibid.*).

particular true for bulky and perishable food products. Perishability limits the marketable life as a fresh product and thus the period during which it can be used as a raw material for processing (*ibid.*, p.13). As a result, food products must be handled within a set time period and investments in special transport and storage facilities (e.g. refrigerated trucks) must be undertaken. Finally, rapid perishability increases transaction costs since it requires that the raw products are repeatedly screened or rated for quality at each stage in the food chain (*ibid.*).

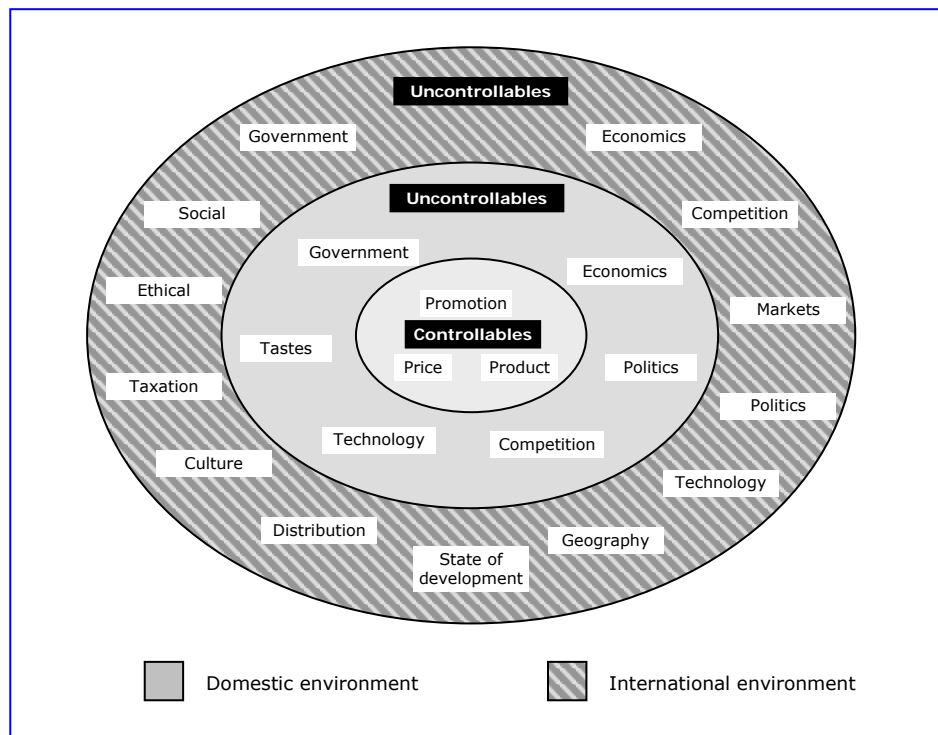
Transaction risks⁸² result from the fact that operations in foreign markets add more "uncontrollable" factors to a business deal, thus increasing its complexity (CARTER 1997, pp.13-14). Doing business in an international environment means therefore coping with an additional "layer" of uncontrollable factors as illustrated in Figure 18. The resulting risks can be classified in economic and political risks (ULLMER & BÖTTGER 1995, p.310).⁸³ *Economic risks* include delivery risks, i.e. uncertainties concerning the expected completion of the contract, or macro-financial risks such as a possible change in exchange rates or foreign interest rates. There is also an increased transport and storage risk. *Political risks* arise from government actions which deny or restrict the right of a foreign owner/investor to use or benefit from his/her assets, or which reduce the value of a transaction or of an investment⁸⁴ (O'CONNELL 1996, pp.230-232). Particular risks related to international transactions of food products result from the perishable nature of these products, as long transport times and inappropriate storage enhances the likelihood of product loss or value decline (JAFEE & GORDON 1993, p.13; PAWSEY 1995).⁸⁵

⁸² The concept of *risk* can be related to a decision situation where (i) more possible outcomes exist as actually will occur, (ii) where not all outcomes are being seen as favourable to the decision maker, and (iii) the consequences of a decision are not completely clear, i.e. the causal link between decision and outcome is not known (BERNSTEIN 1998). Such a constellation involves risk, i.e. a probability greater than zero of being confronted with an unwanted result as a consequence of a decision. International business transactions are more risky than domestic ones because the foreign business environment and the transport of the goods over possibly long distances and maybe other foreign — possibly unknown — territory increases the number of possible outcomes for the completion of a business transaction and therefore the likelihood of being confronted with a business failure.

⁸³ A different, but recommendable treatment (in German) of risks occurring in international market transactions can be found in PEPELS (1997, p.19-23).

⁸⁴ The best known *political risks* for foreign businessmen include (a) confiscation of private property, (b) contract repudiation, i.e. a foreign government terminates a contract without showing cause, refuses to pay for delivered goods, cancels the contractor's licence to operate, etc., (c) currency inconvertibility, (d) discriminatory taxation, (e) embargoes, (f) expropriation of property, (g) nationalisation, (h) war risks, or (i) wrongful calling of guarantees (O'CONNELL 1996, p.230-232).

⁸⁵ Typical *risk management tools* used by companies are (a) insurance, (b) hedging (of financial risks), (c) transferring risk to third parties (e.g. through outsourcing) which are more knowledgeable or better equipped to deal with a particular risk, or (d) legal mechanisms such as e.g. adopting a limited liability status in a commercial operation (DICKINSON 2000).

Figure 18: Foreign uncontrollable factors in the international business environment

Source: CARTER S. (1997), *Global Agricultural Marketing Management*, FAO, p.14.

The internationalisation process of a company depends on both the costs and risks involved in establishing a foreign market. Typically small- and medium-sized enterprises (SME) which decide to internationalise choose a step-wise strategy in their internationalisation efforts and as an initial foreign market entry form will prefer one which involves minimal costs and risks (DALLI 1994; MAURER 1996).⁸⁶

Several foreign market entry and serving strategies exist (see e.g. CARTER 1997, Chapter 7; MACHARZINA & OSTERLE 1997). The individual methods can be categorised in different ways. In the following the distinction will be made between three categories of serving foreign markets: (i) export, (ii) co-operation, and (iii) foreign direct investment (KUMAR & EPPLE 1997).

Exporting can be defined as "the marketing of goods produced in one country into another" (CARTER 1997, p.122). Exporting may be seen as one of the simpler, less costly and less risky market entry strategies. Exporting methods include indirect or direct export. *Indirect exporting* includes the use of

⁸⁶ The costs of building a foreign market will include both (a) the initial investments necessary to establish a commercial connection with the foreign market, and (b) the transaction costs which come along with each deal in this market. The initial investments may include expenses for identifying general market demand, for learning about the foreign legal and economic environment, for a general risk analysis, for finding transport and storage facilities, etc. These costs may be seen as fixed "sunk costs", as these expenditures cannot be re-gained in the case of a withdrawal from the foreign market. However, these initial investments may only be necessary for companies which *actively* seek to expand into foreign markets. For the case of *passive* exporting — that is for example a company is approached by a foreign importer who buys *ex works* and takes over all marketing activities — the indirect export transaction may not be more difficult nor more costly than a home market deal (CARTER 1997, p.122).

trading companies, export management companies, piggybacking⁸⁷ or countertrade⁸⁸. Here the manufacturing company is only indirectly involved in the management of the export problems which are handled by a third party. *Direct exporting* involves the use of an agent, distributor or even an overseas subsidiary. The manufacturing company thus organises and controls the exporting process and needs to have special know-how. Exporting activities can take different degrees of intensity. On the one hand, there is the difference between *passive* and *active* exporting (see Footnote 86). On the other hand, the literature dealing with international marketing management makes the distinction between export *selling* and export *marketing* (KEEGAN 1995, p.581). Export selling means to simply deliver existing products to foreign customers without any modifications. Export marketing, however, involves the tailoring of the product, its price, or the promotional strategy to the international market (*ibid.*).

Co-operation agreements involve the transfer of the production of goods to a local partner in a foreign country. Such agreements are typically more costly and risky strategies for serving foreign markets than exporting because reliable partners need to be found, contracts may need to be negotiated for longer periods and more knowledge about the commercial conditions in the foreign market is demanded. Moreover, depending on the type of the co-operation agreement, assets (intellectual or physical) need to be transferred to the foreign country which makes these agreements more costly in case of a business failure and thus also more risky. Finally, the handing over of the production responsibility to someone else may make difficult to ensure that product quality standards are internationally equal. Co-operation strategies include contract manufacturing, licensing (including leasing and franchising) and joint ventures (CARTER 1997, p.122). *Contract manufacturing* involves finding a partner enterprise which is able to reliably produce a good according to set standards. However, for this agreement all assets of an internationally expanding organisation stay in the home country. *Licensing* can be defined as "the method of foreign operation whereby a company in one country agrees to permit a company in another country to use the manufacturing, processing, trademark, know-how or some other skill provided by the licensor" (*IBID.*, p.127). In this case, intellectual assets need to be transferred to the foreign country. *Joint ventures* can be defined as "an enterprise in which two or more investors share ownership and control over property rights and operation" (*ibid.*, p.128). Here capital investments need to be undertaken, making the whole agreement more risky. In addition, these co-operation strategies differ in the degree of autonomy and responsibility the foreign partner takes over. Of course, the higher the involvement of a foreign partner the better the relationship with him/her needs to be established beforehand.

Foreign direct investments can be divided into setting up (i) a foreign production facility, or (ii) a foreign subsidiary including also administration and marketing services. Both forms involve capital investments which increase the cost and the risk of a foreign market engagement. However, in the long run and after the creation of a sufficient 'critical mass' of local demand, this market serving form may be the

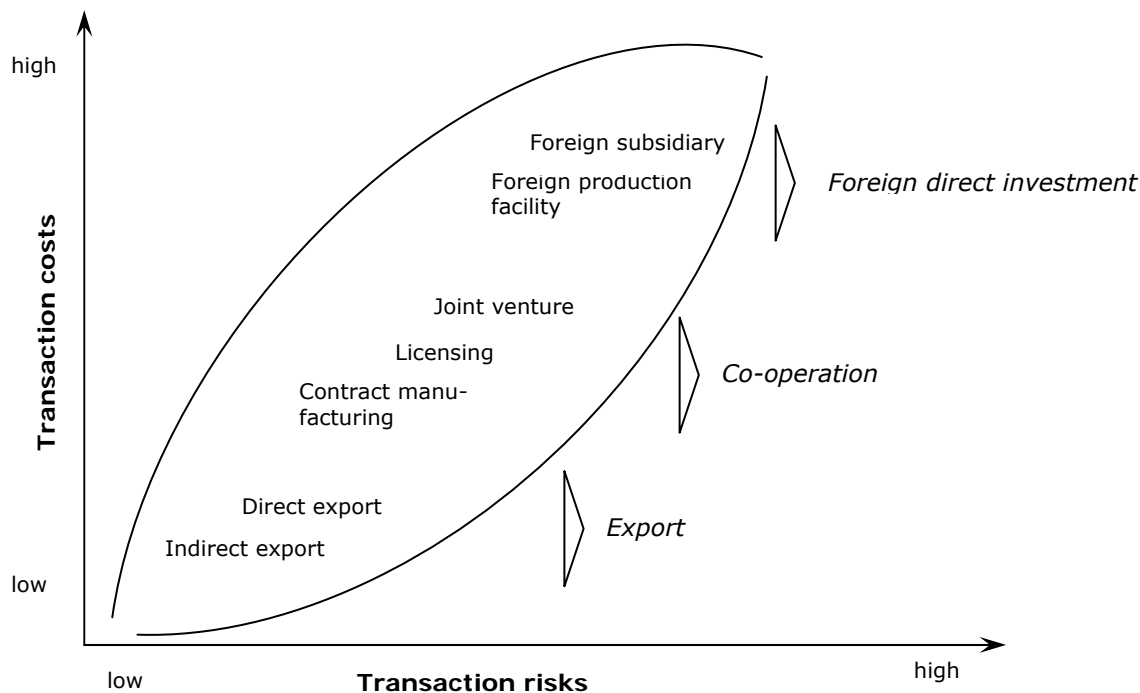
⁸⁷ *Piggybacking* is a method of indirect export where an organisation with little exporting skills may use the services of one that has. Another form is the consolidation of orders by a number of companies in order to take advantage of bulk buying (CARTER 1997, p.125).

⁸⁸ *Countertrade* is defined by the UN as "commercial transactions in which provisions are made, in one of a series of related contracts, for payment by deliveries of goods and/or services in addition to, or in place of, financial settlement" (CARTER 1997, p.125). Countertrade is the modern form of barter, except contracts are not legal and it is not covered by GATT (*ibid.*). It is estimated that countertrade accounts for 20-30% of world trade (*ibid.*).

most cost efficient one as argued in Section 2.3.3. For SMEs a foreign direct investment may however not be the typically preferred market entry strategy to start an internationalisation process, given the high capital needs and foreign market know-how involved in it.

Figure 19 shows different market entry/serving forms and the risks and costs that are involved in the individual strategies. Transaction costs involve here the total cost of serving the foreign market including the first initial investments to establish a foreign market connection. As argued in Footnote 86 these investments may be seen as "sunk costs" and can be very capital intensive, especially for foreign direct investments. Therefore it should be clear that Figure 19 is also a picture of a typical internationalisation process of a company. In general, a company will start to serve foreign markets by export activities before it may opt for a more advanced and more risky market serving strategy.

Figure 19: Foreign market entry/serving strategies



Source: Adapted from MUELLER-STEWENS G. & LECHNER C., 'Unternehmensindividuelle und gastlandbezogene Einflussfaktoren der Markteintrittsformen', in MACHARZINA K. & OESTERLE M.-J. (eds.), *Handbuch Internationales Management : Grundlagen - Instrumente - Perspektiven*, 1997, p.237.

In summary, it should have become clear that foreign market operations are more complex and thus more difficult to manage than home market operations. The fundamental reason for this is the higher transaction costs and higher transaction risks which are involved in foreign market operations. For food producing companies these costs and risks may be especially high, given the usually perishable nature of food products. However, different market entry/serving strategies expose a company to higher or lower degrees of costs and risks and thus companies which plan to internationalise their commercial activities will typically start to gain first foreign market experience via exports. In the following, only the export strategy will be further discussed.

3.1.1.2 Empirical findings from the literature

Empirical investigations are needed to determine the actual factors — and their individual weights — which may hinder companies from expanding their commercial activities into foreign markets. The existence of high transaction costs does not necessarily mean that financial resources determine export success. Non-financial aspects such as specialised know-how, negotiations skills, management capacities, and time and effort allocation may also play crucial roles in successful exporting.⁸⁹ Equally, even if risks are high in foreign market transactions, it is well-known that some companies are more successful in dealing with these risks than others. Therefore there must be organisational aspects in the export business which allow it to better deal with occurring risks. In theory, general obstacles that agribusiness companies may encounter when trying to expand in foreign markets can be manifold, as e.g. SINGH (1996, p.100) argues:

In fact, barriers to entry could be many and they differ from the ones firms face in the domestic market. Some of these barriers in international markets are: culture, language, nature and accessibility of distribution channels, government policy, expected global and local competition, political and economic environment, exchange rate changes and customer switching costs.

In order to determine therefore *relevant* factors that influence export performance, in particular for food product exporters several empirical studies that have been conducted during the last decade are reviewed in the following.

Extensive cross-country but not sector-specific studies that were conducted with exporting companies show that in fact a number of factors significantly influence export performance. This indicates that there is no simple answer to the problem. For example, STYLES & AMBLER (1997) find in a questionnaire survey of 434 exporting companies from Great Britain and Australia that high performers are more likely to (i) visit their export markets more often in order to better understand them, (ii) build close, trusting, long-term partnerships with their foreign distributors, and (iii) commit fully to export projects. The authors stress thus *the importance of relational aspects with foreign business partners*. Product quality, country-specific adaptations of marketing strategies or export market infrastructure such as roads or telecommunications facilities, however, were not found to have a significant influence of the export performance of the surveyed companies. In another survey of 296 exporters from the US, the UK and Germany, DIAMANTOPOULOS & SCHLEGELMILCH (1994) examine the linking of export manpower to export performance. In particular the researchers examine variables such as the *proportion of export managers* (as % of all managers) and *export employees* (as % of all employees), the *education and specialised training of the export managers*, the *number of overseas visits* of export managers, their *attendance at international trade fairs*, and their *attitudes towards exporting*. The study results show that factors such as (i) export managers convinced of the importance of exporting, (ii) specialised training in exporting, (iii) trade fair attendance, and (iv) overseas visits, are positively related to a company's export performance. Yet, the empirical results reveal also that higher staffing ratios with export managers or export employees do not significantly affect export performance, indicating that the quality of the export personnel is more important than its quantity.

⁸⁹ A company which has large financial resources available may of course be able to buy expert knowledge, management and negotiation skills, foreign market contacts, etc. from external sources when preparing to internationalise its commercial activities. In reality, however cost-free financial capital is the limiting factor for almost all companies, thus restricting the possibility of buying expensive external services.

Findings from US food processing and agribusiness companies which operate in international markets indicate that apart from general export management problems, the perishable nature of the food product adds to the complexity of successfully completing international transactions. For example, BYFORD & HENNEBERRY (1996) in surveying 267 food processing companies from Kansas, Missouri and Oklahoma find that the main obstacle in exporting for these companies is the *nature of the product* itself. The researchers argue that (p.254):

Most food products, particularly processed foods, are perishable. This presents certain problems not associated with the majority of manufactured goods. Special handling, transportation, and storage are often required, at a substantially higher cost.

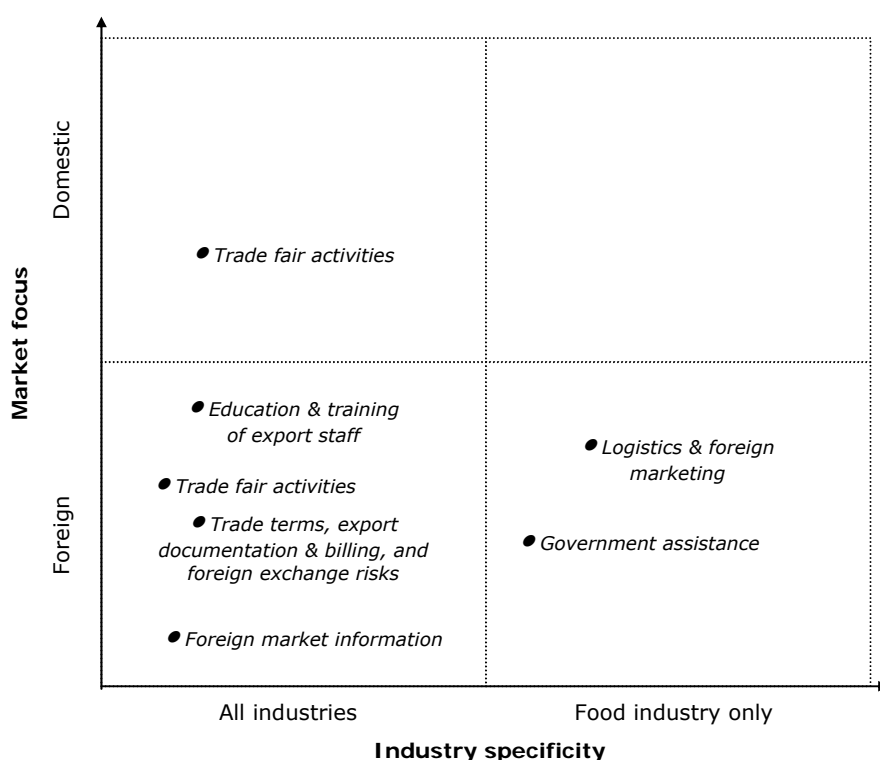
Other major obstacles to international trade which are named by the surveyed companies are (i) *developing a market for the product*, (ii) *exchange rate and financing problems*, and (iii) *receiving the payments for the exported goods*. As marketing techniques to overcome these obstacles the companies (i) participate in government export promotion programs, (ii) use export brokers or consultants, (iii) customise packaging for foreign markets, (iv) adapt the product itself to foreign markets, (v) produce promotional materials in foreign languages, (vi) employ bilingual marketing staff, (vii) publish ads in foreign trade journals, and (viii) use forward contracts (or other hedging tools) for currency exchanges. Additionally, in analysing non-exporting companies' responses, managerial apathy (i.e. a non-interest in exporting) was found as a major reason for not expanding into foreign markets. In another survey study of 113 Louisiana agribusinesses HUGHES *et al.* (1999) find as main obstacles encountered by the companies when exporting: (i) communication (insufficient foreign language skills), (ii) transportation costs, (iii) trade barriers (e.g. tariffs, quotas), (iv) locating potential markets, (v) complicated documentation, (vi) unfamiliar foreign trade procedures, (vii) determining preferences or altering products for foreign markets (e.g. package type and size), (viii) company size and capital, and (ix) insufficient financial return. The study also finds that companies do not seem to fully utilise the resources made available to them through the state and federal governments (p.58).

European food product exporting companies, in general, face the same problems, as several studies have revealed. For example, OLLILA (1995) investigated the problems encountered by Finnish food industry companies face when trying to enter the German and Dutch Markets. His survey results, which derived from 29 questionnaire respondents, indicate that (i) the *knowledge of the foreign markets* (identifying local competitors, finding the right import agent, knowing local consumer preferences), and (ii) *good communication* (foreign language) *skills* are perceived as the main success factors. In the case of Turkey, ATES & SEN (1998) surveyed 72 small- and medium-sized agro-industry companies. Their study finds as major success factors (i) *managerial skills* (education and training and foreign language skills), (ii) *financial resources* and *access to export credits*, (iii) *product characteristics (quality)* and *price*, (iv) the *intensity of foreign marketing activities* (foreign market visits, trade fair attendance, contacts to commercial attachés in foreign markets or to foreign attachés in Turkey), and (v) the *size and corporate age of the firms* (larger and older companies show better export performance). CHRYSSOCHOIDIS (1996) interviewed the four largest Greek food product exporters and finds that export success, as measured by foreign market share, is influenced by (i) *market-related elements*, such as the size and demand structure of the foreign markets, (ii) *product-related elements*, such as product quality, the adaptation of the product to a foreign market, and branding issues, and (iii) *distribution related elements*, such as the quality of the contacts with importers.

As conclusion from all these research findings it becomes clear that a whole bundle of factors affects the export performance of companies exporting food products. Although the discussed studies do not all investigate the same aspects of the complexity of foreign trade transactions, it is still possible to extract the main obstacles that seem to play a role in the export business. The most common problem areas may thus be seen as: (i) *education and training of export staff* (including foreign language skills and knowledge of foreign business partner's mentality); (ii) *trade fair activities*; (iii) *special food product logistics and marketing problems*; (iv) *trade terms, export documentation and billing, and foreign exchange risks*; (v) *provision of foreign market information*; and (vi) *government assistance*.

A categorising of these management problems may help to better understand their nature. Management problems can be specific to domestic or to international business (or they occur equally in both fields). For example, human resource administration is a general management problem, but the administration of expatriate staff is specific only to businesses which operate internationally. Thus, one source of management problems can result from the market focus of a business. A second source of management problems are specific to the industry a business belongs to. For example, the problems faced in the marketing of cars are usually quite different to those occurring in the music industry. Figure 20 shows a categorisation of the above identified problems which food product exporters face according to the dimensions *market focus* and *industry specificity*.

Figure 20: Categories of business management problems



Source: Author's draft.

In the following, these special problem areas will be explored in more detail in order to gain a better understanding of the issues that may hinder food manufacturing companies from expanding their commercial activities into foreign markets.

3.1.2 Specific management problems related to food product exports

This section examines more closely the special problem areas which food product exporters face in their internationalisation activities. It is important to understand these aspects well in order to be able to assess accurately their possible impacts on the export performance of food manufacturing companies.

3.1.2.1 Education & training, foreign language skills, and knowledge of foreign business partners' mentality

The positive impact of a good job training of export managers on export performance has been shown by empirical research (see above). Furthermore, this aspect is also stressed in the theoretical *international management* literature (FORZELY 1994; RAUPP 1997). Export-management relevant knowledge and business skills can be required through special university courses (at undergraduate or graduate levels) or MBA programs, etc. Sometimes government agencies offer relevant courses, too. There is also the possibility of obtaining appropriate skills in a foreign country. Finally relevant skills can be acquired through on-the-job training and practical experience. It is *a priori* not completely clear, which courses are best for gaining the necessary management skills for successful exporting. A business (commerce) or economics course may be useful, but an agriculture or food related course may be equally helpful when complemented with additional commercial knowledge. Law studies may also be useful, especially when operating in the food sector, where extensive and country-specific food legislation frequently exists. In general, it should be clear that the better and the more specific the knowledge and skill level of the export staff — managers and employees — is, the more likely complex export deals will be accomplished successfully. Therefore a hypothesis can be formulated that higher relevant knowledge and skill levels of export staff will affect the export performance of a company positively.

Foreign language skills of export staff may also have a positive impact on the export success of a company. This effect was found in the empirical studies discussed above and the importance of foreign language skills is also stressed in the theoretical literature (e.g. FORZLEY 1994). On the other hand, it is clear that English is today's most important business language (the *lingua franca*) and most international business deals can and will be negotiated in this language (MCCUE 1998, p.18). Why therefore learn other languages than English? The answer to this question may have been provided by the results of an extensive study of STANLEY *et al.* (1990). In learning a foreign language, people learn about the country, its economic, political and legal system, its culture and consumption habits, its people, etc. A good knowledge of these aspects is important when doing business in a foreign markets as it may reduce insecurity. Thus, learning a foreign language does not only improve the communication and thus negotiation skills, it also provides positive 'external' effect in that the language learner acquires important and valuable knowledge of a foreign business environment. A detailed knowledge about the particularities of a foreign market may not be important for "global", i.e. highly internationally standardised goods. However, for the international marketing of "culture-bound" goods such as food products, detailed knowledge of a foreign culture and its consumption habits may be crucial. Therefore the hypothesis can be formulated that higher levels of relevant foreign language skills of the export staff should have a positive effect on the export performance of a company, in particular in the food business.

Good knowledge of foreign business partners' mentality may also be important for the export success of a company. Business mentality is part of a culture of a country.⁹⁰ Cultural differences do exist between countries. For example HOFSTEDE (1991) examines cultural differences connected to work-related issues and finds as most important dimensions: (i) power distance, (ii) individualism versus collectivism, (iii) masculinity versus femininity, and (iv) uncertainty avoidance. These dimensions allow him to identify country cluster with similar cultures.⁹¹ A different — more operational — way of classifying countries according to cultural differences is provided by SCHUSTER & COPELAND (1996). According to their classification system, businessmen from different cultural background differ in their (i) approach to the *task* to be accomplished, (ii) the role of *relationships* in making business decisions, and (iii) their assumptions regarding the use of *time*. For example, North American and North-western / Central European cultures are typically characterised by their primary focus on (p.19)

getting the task at hand and accomplishing it as efficiently and quickly as possible. Typically, the relationship between the buyer and the seller on both sides in the negotiation situation is less important than task completion. Time is an important component in these cultures, and using it efficiently is a critical goal and an admired measure of skill.

On the other hand, in Mediterranean countries there is a more *polychronic* attitude towards time, i.e. deadlines are more flexible and several issues are handled in a parallel way. Contrarily, in the Nordic (and Anglo-Saxon) countries the use of time is typically *monochronic*: deadlines are seen as fixed and issues are handled serially, i.e. one thing after another. In Mediterranean countries the relationship has, in general, more importance and some effort has to be undertaken to develop it in order to accomplish a business deal. In the Latin American culture the importance of the relationship is even greater. However, relations can be developed *during* a business transaction. In many Asian countries, in the contrary, where the relationship between two business parties is equally or even more important, it needs to be established *before* a deal (SCHUSTER & COPELAND 1996). This makes business negotiations in these cultures a lengthy affair. Thus there is a distinct difference between the 'short-run deal making' business approach of Anglo-Saxon/Nordic countries and the 'long-run relationship building' approach of Mediterranean/Latin American and Asian countries (SEBENIUS & LAX 2000). The existence of these country specific differences makes therefore "training in cross-cultural competency" (KEEGAN 1996, p.146) of export managers necessary. Of course, when talking about cultural differences there is always the danger of falling into stereotypes. In fact, cultural differences are more a statistical phenomena. That is, for one particular characteristic the mean of two populations can differ which makes it more likely that one single person from the population shows this characteristics. However, it is possible that this person is accidentally an exception and behaves not as expected. As business deals are negotiated between individuals, relying on generalities therefore may be too insecure. Thus, although cultural differences at the aggregate level clearly exist, it would be unwise to blindly rely on them in an individual case. In general, however, the hypothesis can be postulated that good knowledge of export managers about foreign business partners' mentality should have a positive effect on the export performance of a company.

⁹⁰ Here, the term 'culture' will not be defined nor discussed as very many different concepts of this term exist and the differences between them are at last philosophical. However, a good discussion of this term from an international marketing point of view can be found in KEEGAN (1996, Chapter 4) and CARTER (1997, Chapter 3).

⁹¹ For example, clustering countries according the two dimensions uncertainty avoidance and power distance shows, that Nordic and Anglo-Saxon countries are characterised by small power distance and weak uncertainty avoidance, whereas Mediterranean and South American countries display large power distance and strong uncertainty avoidance. The Germanic group is characterised by small power distance and strong uncertainty avoidance (HOFSTEDE 1991).

3.1.2.2 Trade fair activities

In theory, trade fairs are one of the most efficient places for doing business. They are in general cost effective and they bring together large numbers of sellers and buyers at one place and at one time (MILLER 1990). Trade fairs are thus *real* market places where supply and demand are concentrated, and given this concentration, business contacts can be easily established. Trade fairs are in this respect highly effective because they reduce transaction costs as compared to the normal business situation where sellers and buyers are usually geographically dispersed. It can therefore be hypothesised that a more intensive participation in trade fairs (especially foreign ones) of exporting companies will affect the export performance of companies positively.

Purposes of trade fair participation are manifold (MCCUE 1998). They range from (i) obtaining general information, (ii) market analysis and observation of competitors, (iii) making, keeping, or improving contacts, to (iv) the acquisition of deals. For exhibitors, the presentation of a company or its products can be an additional major reason for participation in a trade fair. Of course, the importance of these purposes of trade fairs may be different for each company.

The participation in trade fairs needs thorough preparation (MILLER 1990; MCCUE 1998). Trade fair stalls need to be designed according to the company's general public appearance, and the products it presents. Employees need to be trained, customers contacted and invited before the start of the fair, a selling strategy needs to be worked out, accommodation to be organised, etc. MILLER (1990) suggests also organising a follow-up meeting of all staff who prepared or worked at a fair in order to evaluate the performances and to identify and eliminate problems for subsequent trade fairs.

Assistance for the participation in international trade fairs (and sometimes also for domestic ones) is offered in many countries by governments and private institutions. This assistance exists in different forms, such as e.g. financial support (for participation fees, travel and accommodation expenses, etc.), advice, the organisation of shared national or regional stalls, etc. In particular SME may need some kind of assistance, given the complexity of successful trade fair participation (in particular of those in a foreign country) and the usually important volume of business that may be at stake.

Important trade fairs for food product producers and distributors are in Europe the SIAL food and beverage fair of Paris, held in alternate years with the ANUGA fair in Cologne. In Asia the biggest food sector trade fair is the FOODEX in Japan. In the US the biggest food industry trade fairs take place each year in Chicago.

3.1.2.3 Special logistics and marketing problems

The perishable character of food products (JAFEE & GORDON 1993; PAWSEY 1995) and their status as "culture-bound" goods (CARTER 1997) makes food products in general difficult to transport over long physical distances and to market them to foreign countries. In particular four problem areas are encountered in the international food product business: (i) special logistics problems (i.e. storage and transport), (ii) the positive or negative effects resulting from the image of the country or region of origin,

(iii) the adaptation of the recipe or packaging to foreign markets, and (iv) problems related to different national food legislation or trade impediments such as tariff formalities or quota regulations which are common for agricultural goods.

Logistics in international food product trade is particularly important as food product life is usually short and environmental factors such as temperature, moisture, oxygen levels and vibrations have to be controlled strictly in order to prevent premature product losses (PAWSEY 1995; KANTOR *et al.* 1997). Product life and transportability depend on the kind of processing and preservation applied to the food product. For example, dried fruit is less likely to deteriorate during long distance transport than fresh fruit. Similarly, deep freezing slows biodegradation and increases transportability, under the condition of a guaranteed cold chain (PAWSELY 1995). Other preservation techniques include chilling, bottling/canning, or smoking (*ibid.*). The choice of an appropriate transport vehicle is also important for preventing product losses. Typically, highly perishable food products such as fresh fruit and vegetables or fresh sea foods need to be transported over long distances by air plane. However, this form of transport can be costly and air freight capacities can be limited (CARTER 1997, Chapter 10; RIRDC 1994). Other types of transport include ships, trains or (refrigerated) trucks. Appropriate storage and handling is another factor that can crucially affect product life. For example, KANTOR *et al.* (1997, p.4) estimate that a typical food product is handled about 30 times before it is touched by a consumer. As the international marketing process of a food product is much more complex, this figure can be expected to be even higher in cross-border transactions, thus increasing the risk of quality losses (PAWSELY 1995). Appropriate packing and storage techniques (e.g. in specially-designed containers or controlled atmosphere and air-conditioned storage) reduces this risk (*ibid.*). Given these particular characteristics of food products it becomes clear that logistics is a crucial factor in successful exporting. This may even be more true, due to the fact that food production and marketing is very often a seasonal affair, which increases storage and transport problems, as considerable storage and transport capacities need to be made available but only for limited periods during the year.

The origin of a food product is commonly used in marketing campaigns (SKAGGS *et al.* 1996). Consumers make use of the origin information to evaluate quality of a food product (*ibid.*).⁹² This can happen in a positive or in a negative manner. For example, for French cheese, German beer, Italian pasta, Florida citrus fruit, etc. the origin is seen as a positive quality attribute by many consumers. On the other hand, South African food products (fresh fruit or wine) were boycotted by many international consumers during the apartheid regime. However, in general the origin of a food product will only be highlighted in international marketing campaigns if the origin label is believed to have a positive effect on the product quality perception of consumers. Positive images of origin are often derived from famous agricultural areas or holiday destinations which offer a broad range of regional food specialities (such as the Tuscany area in Italy). In all, it can generally be assumed that highlighting the origin of a food product in international marketing campaigns may have a positive effect on the export performance of a food manufacturing company.

⁹² See also Footnote 57 for a more detailed descriptions how consumers use origin information for quality evaluation.

The adaptation of a food product to a foreign market in recipe and/or packaging (or price) may also play a crucial factor for export success. Food products are often bought because of their taste, and tastes differ through geographic areas. For example, even in such "global products" such as e.g. Coca-Cola sugar contains and acidity levels are adapted to local preferences. Moreover, religious reasons (e.g. the objection of pork in Muslim countries) or cultural reasons (e.g. the choice of drink that accompanies meals) can be significant trade barriers for food products. The same may be true for the packaging of food products. Different countries have different preferences for product size and packaging. For example, in Mediterranean countries drinking water is sold in plastic bottles, whereas in Germany returnable glass bottles are used. Australia innovated the marketing of wine casks (3, 5 or 10 litres) which sell well in Australia and the US but badly in Europe where households usually have smaller refrigerators and thus the cooling of the wine becomes a problem. In France and Italy, food product promotion are often of the type "buy three, get one for free", whereas German consumers are more sensitive to price reduction promotions. Knowing about these differences and adapting the food products to local tastes or habits and customs can have an important effect on the export performance of a food producing company.

Different national food legislation and other administrative rules (e.g. tariffs, quotas, reporting obligations to statistical agencies, etc.) can be significant trade impediments (CARTER 1997). For example, the USA and Australia do not allow the import of unpasteurised milk products such as raw milk cheese. German food law prohibits the production of beer in Germany that is not brewed according to its purity law standards. Different countries have different legislation concerning additives such as preservatives or colourings. Even if the *Codex Alimentarius Committee* of the FAO/WHO has created a catalogue of broadly accepted standards, there are still considerably national differences. For example, in the USA and Australia the use of sulphur in the wine making process must be declared as preservative on the label. In Europe, this additive is seen as an unimportant and "natural" ingredient which does not need to be declared on the wine label. Detailed knowledge of a foreign market's food legislation may thus be necessary for successful exporting into this market. The same may be true for tariff formalities, quota regulations, reporting to statistical organisations, etc. Agricultural products belong in general to the most protected goods, and tariffs schemes are complex (*ibid.*).⁹³ To know about these trade impediments may thus be important when foreign markets are to be entered via exports. In sum, it can be hypothesised that good knowledge of export managers concerning foreign food legislation and trade administrative rules are important for successful food product exporting.

3.1.2.4 Trade terms, export documentation and billing, and foreign exchange risks

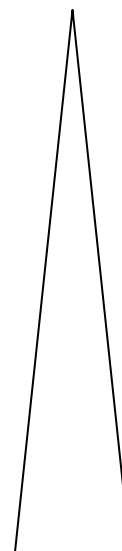
International commerce terms (INCOTERMS) are standardised trading terms which are approved by the International Chamber of Commerce (ICC in Paris), and which exist in order to reduce misunderstandings, disputes and litigation between international parties in trade transactions (O'CONNELL 1999). INCOTERMS are a terminology which describe the responsibilities of parties (usually buyers and sellers) in international trade transactions. The terms specify which party is responsible for paying for

⁹³ Here all existing forms of tariffs and quota regulations will not be discussed, but see e.g. CARTER (1997, Chapter 4) for an overview.

insurance, and other transportation requirements (*ibid.*). The most recent revision of INCOTERMS took place in 1990. The following table lists the 1990 INCOTERMS:⁹⁴

Table 43: International commerce terms 1990

EXW	<i>Ex works</i> (named place)
FAS	<i>Free alongside ship</i> (named port of shipment)
FCA	<i>Free carrier</i> (named place)
FOB	<i>Free on board</i> (named port of shipment)
CFR	<i>Cost and freight</i> (named port of destination)
CIF	<i>Cost, insurance and freight</i> (named port of destination)
CPT	<i>Carriage paid to</i> (named place of destination)
CIP	<i>Carriage and insurance paid to</i> (named place of destination)
DAF	<i>Delivered at frontier</i> (named place)
DES	<i>Delivered ex ship</i> (named port of destination)
DEQ	<i>Delivered ex quay duty paid</i> (named port of destination)
DDU	<i>Delivered duty unpaid</i> (named place of destination)
DDP	<i>Delivered duty paid</i> (named place of destination)



Seller's responsibilities

Source: Adapted from O'CONNELL J.J. (ed.) (1999), *The Blackwell encyclopaedic dictionary of international management*, Blackwell Publishers Ltd., p.161.

These 13 INCOTERMS are listed in an order of increasing seller responsibilities. That is, the lower the placing of the INCOTERM in the above table, the more duties (transport, insurance, etc.) the seller has to take over. Therefore the choice of an INCOTERM of two parties reflects also their power relationship: a strong seller will typically prefer E- or F-terms, whereas powerful buyers would prefer D-terms (ALTMANN 1997).⁹⁵ INCOTERMS facilitate international trade transactions because they provide an internationally approved contract framework with standardised norms that describe exactly the responsibilities of sellers and buyers. The INCOTERMS are thus an efficient means of reducing transaction risks (because they reduce insecurity through regulation) and transaction costs (because they are standardised contracts). Making use of these terms in an appropriate and frequent way should therefore have a positive effect on the export performance of a company as a result of lower transaction costs and risks.

Export documentation is a complex matter, too. In international trade transactions a number of documents are asked for by private and/or government bodies in both the exporting and importing country. The documents are either required by the importer to satisfy the country's trade control authorities or the importer may also want to ensure that the exporter fulfils the requirements for documentary letter of credit operations in order for payment to be effected (CARTER 1997, p.207). Table 44 lists some of the most

⁹⁴ For a more detailed discussion of each term see e.g. CARTER (1997, Chapter 12); O'CONNELL (1999) or ALTMANN (1997).

⁹⁵ Some INCOTERMS are for use with seafreight only, e.g. FAS, FOB, CFR or CIF and are not recommended when goods are to be consigned by air (as it is frequently the case for fresh food products). For airfreight use the terms FCA, CPT and CIP should be used (ALTMANN 1997).

common export documents which, however, are not all used in every international trade transaction, and which can differ through countries.⁹⁶

Table 44: A list of basic documents used in export trade

a) Invitation to quote	o) Health, sanitary, phytosanitary, veterinary certificates
b) Quote	p) Quality inspection certificate/certificate of value
c) Pro forma invoice	q) Independent third party inspection certificate
d) Order confirmation/acknowledgment	r) Dispatch advice note
e) Bill of lading/short form bill of lading	s) Dangerous goods declaration
f) Airway bill	t) Shipping or export consignment notes
g) Marine (other) insurance policy	u) Documentary credit of payment drafts
h) Commercial invoice	v) Export licences
i) Consular invoice	w) Import licences
j) Certified invoice	x) Exporter's commission advice to agent
k) Certificate of origin	y) Customs and Excise export entry forms
l) Packing list/weight note	z) EU Movement documents EUR1 Form
m) Specification sheet	α) Other specifically requested documents
n) Manufacturer's analysis certificate	

Source: CARTER S. (1997), *Global Agricultural Marketing Management*, FAO, p.207.

International payment terms have been created for the same reasons as INCOTERMS: to standardise international payment transfers and thus to reduce the involved financial risks and costs (ALTMANN 1997). There are five basic methods of payment which can be divided into two main groups: (1) non-documentary payments and (2) documentary payments. *Non-documentary payments* include the payment methods (i) *cash before delivery* (c.b.d), (ii) *cash on delivery* (c.o.d), and (iii) *simple invoice with due date* (*ibid.*). These payment methods are simple and inexpensive to arrange as they do not make use of an intermediary third party. However, they leave the exporter or the importer with considerable risks of either non-payment or non-reception of the goods. In cases where more security is needed, the use of more secure payment arrangements is recommended. *Documentary payments* offer more transaction security but resulting transaction fees can be considerable, since these payment modes demand third-party involvement (usually a bank in the exporter's country or a bank in both countries). There are two main documentary payment groups: (i) *documentary collections (drafts)* with the two basic forms of 'documents against payments' (d/p) and 'documents against acceptance' (d/a), and (ii) *letters of credit (L/C)*. The document collection methods make use of certain documents (usually the 'bill of exchange', also called 'bill of lading' or 'draft') which need to be transferred in order to release the goods to an importer which are kept under a third party's control. Thus, when an exporter transfers goods to an importer in another country, the importer must provide certain documents (the bill of exchange, or an export declaration, etc.) to the import country's customs authority in order to take possession of the goods. Usually a bank representing the exporter in the importer's country has possession of the documents needed to release goods. Upon presentation of payment from the importer, the bank transfers the documents and the importer gains title

⁹⁶ These documents will not be discussed in detail here, but see CARTER (1997, Chapter 12) or O'CONNELL (1999) for more information about the individual documents.

and possession of the imported goods (O'CONNELL 1999, p.79). Under the d/p method the bank must hold the title documents until the bill of lading is cashed. Under the d/a method the bank releases the bill of lading to the importer as soon as he/she accepts its payment within a defined period of time. In the d/p method the importer runs a risk as he/she pays the goods without having seen them. In the d/a method the exporter runs a risk since the goods are released to the importer without the bill is actually cashed. In order to eliminate this imbalance of risk, an even more secure payment method, the letter of credit was created. Under a L/C arrangement an importer instructs a bank in his own country (the issuing bank) to open a credit with a bank in the exporter's country (the advising bank) in favour of the exporter, specifying the documents which the exporter has to deliver to the bank for him/her to receive payment (CARTER 1997, p.216). These documents serve as proof (through third party inspection and confirmation) that the goods are exactly of the kind, quality and quantity as negotiated beforehand between exporter and importer. Thus, by using the L/C payment mode, the risk of not obtaining the exact kind of merchandise agreed before, or of not being paid is minimised. There are a number of different kinds of letters of credit. The exact nature of the letter of credit used in a particular situation is based upon specific needs of a particular transaction, as well as the degree of trust between buyer and seller (O'CONNELL 1999, pp.192-93).⁹⁷ In general, it should be clear that the mastering of the complex export financing methods can reduce transaction risks and costs, and an effective use of these tools by the export managers should have a positive effect on the export performance of a company.

Other international contract standards exist too which aim to facilitate the complexity of international contracts. For example in the EU, a standardised contract for fresh fruit and vegetables trade was approved in 1967 (WOELFLIN 1997). These "COFEUROP" terms provide industry specific contract standards which allow a simplification of transactions and can thus reduce involved costs and risks.

Foreign exchange rate risks can also be a major factor that may prevent companies from engaging in international marketing operations. Exchange exposures are due to the fact that payables, receivables, or investments in other currencies may change value over time (O'CONNELL 1999, p.99). In international trade the "transaction exposure" is the most relevant form of exchange rate risk, in cases where payments are arranged in a foreign currency. In a situation of a sudden rise of the exchange rate, i.e. the price of the foreign money, the exporter may receive only a lower value (in terms of his own currency) than originally calculated. These sudden — and often unforeseeable — currency changes make foreign business transactions a risky matter. However, several strategies to manage the foreign exchange risks exist (*ibid.*, p.132; KEEGAN 1995, pp.191-98): (i) to arrange contracts on the basis of a fixed exchange rate, (ii) the use of hedging methods on FOREX markets, such as forward contracts, futures, options or swaps, (iii) the opening of long-run foreign exchange accounts with the provision of large amounts of a currency when it is comparatively cheap and the use of this account in times when the currency is comparatively expensive, (iv) the use of other methods, such as the arrangement of payments in a third country currency (e.g. the US\$ or Japanese Yen) which is assumed to be relatively stable during the transaction time. Like with the other contract standards, a good management of foreign exchange risk by the export managers can be expected to have a positive impact on the export performance of a company.

⁹⁷ For a detailed discussion of the different kinds of letters of credit see O'CONNELL (1999, p.193-94). For a detailed

3.1.2.5 Foreign market information

Foreign market information, in particular information about foreign market trends, competitor activities, consumer demand, potential governmental assistance, and other areas can be assumed as crucial for companies engaging in foreign commercial activities. A quick provision of information is even more important in foreign markets, given the fact of the usually non-physical presence of export managers in that market and the likely large geographic distance to it, all making external observation difficult. It is therefore comprehensible that a large body of organisations exist in many countries which try to assist exporters with foreign market information.

Sources of foreign market information are public and government institutions and private information agencies. In many countries government organisations have been especially created for this purpose, or existing networks such as overseas trade chambers engage in these activities. For example, in Germany there is the *Bundesstelle für Außenhandelsinformation* (BfAI), in France the *Moniteur du Commerce international* (MOFI), and in Australia *AUSTRADE*. All these institutions have as their main task the provision of information about foreign markets to national exporters. Apart from government bodies, private market research institutes, such as the internationally operating *Nielsen Inc.* can provide very specific foreign market information.

Food product promotion agencies and commodity marketing boards also observe foreign markets and provide information on them. These kind of institutions exist in several countries, e.g. the German *CMA*, the French *Sopexa*, the Italian *ICE*, the British *Food from Britain*, the Australian *Wheat Marketing Board* or the New Zealand *Dairy Marketing Board*. The primary focus of these organisations is to promote national agricultural commodities and food products in foreign markets, and therefore they need to accurately monitor these markets. Many of these promotion bodies co-operate closely with national producers on foreign trade fairs or in especially organised promotion campaigns.

Modern information technology, such as online databases, the Internet or CD-ROMs facilitate foreign market research as they give quick and low-price access to foreign information resources. In particular the internet removes many barriers to foreign markets by eliminating the obstacles due to geography, time zones, and location, thus creating a "frictionless" business environment (QUELCH & KLEIN 1998, p.229).

In summary, it can therefore be assumed that an intensive provision of relevant foreign market information and an effective use of modern information technologies should affect the export performance of food companies positively.

3.1.2.6 Government assistance

Government assistance to support export activities of national companies can take several forms. KEEGAN (1995, pp.583-84) names (i) tax incentives on earnings from export sales, (ii) subsidies used to reward export performance, and (iii) assistance in form of providing information, advice, the establishment of trade fairs or trade missions, etc. These forms of services are general and not sector-specific. However, it has been shown (see ADAMS *et al.* 1997) for the case of US agribusiness exporters that many export assistance services provided by the federal government are either not known or not used by the companies targeted, i.e. the usually small and inexperienced ones. That is, larger and more experienced companies are more likely to know about and to use existing assistance schemes, mostly because these companies employ specialised staff devoted solely to export activities (*ibid.*, p.293). This fact may lead to the conclusion that government assistance services do affect export performance of a company positively, and larger and more experienced companies devote more resources to the identification and use of these services in order to maximise their impacts.

Additional export assistance is frequently provided in many countries by food product promotion agencies or commodity marketing boards (see the previous section). These bodies can help food exporters in their foreign market activities through the provision of market information, communication (publicity) campaigns, potential customer identification, etc. In line with the reasoning above, it can be hypothesised that the more intensive the assistance of food product exporters with such assistance services is, the better will be a company's export performance.

3.1.3 Summary

The causes of the complexities involved in the management of international marketing activities of food products are, in theory, the higher transaction costs and risks involved as compared to home market deals. Transaction costs are higher due to the generally greater physical distance to the foreign market and the thus resulting greater transport, communication and/or negotiation efforts necessary for business success. Transaction risks are usually higher, since more "uncontrollable factors" exist in foreign markets than in the home market, thus making the successful completion of a foreign business deal less likely.

Concrete problem areas which food product exporters face have been identified by analysing several empirical studies dealing with this topic. The six problem areas which seem to be most important are: (i) *education and training of export staff* (including foreign language skills and knowledge of foreign business partners' mentality); (ii) *trade fair activities*; (iii) *special food product logistics and marketing problems*; (iv) *trade terms, export documentation and billing, and foreign exchange risks*; (v) *provision of foreign market information*; and (vi) *government assistance*. These topics will be investigated in the following survey of Australian and German companies, which engage in the international marketing of food products.

3.2 Empirical results from a survey of international food product marketers from Germany and Australia

The management of international food product marketing activities is a complex and multidimensional problem as discussed in the previous theoretical section. Although some empirical research has been conducted on various aspects of the problem in several countries — as presented above — it has not yet clearly revealed the actual importance, i.e. the 'weights' of the individual problem areas, when they are compared to each other. In particular, only little is known about the significance of logistical aspects in the international food marketing problem structure, especially in the relevant German literature. Moreover, it seems interesting to investigate whether national differences exist in the perception of the individual aspects of problems occurring in the international marketing of food products.

The main objective of the following empirical section is therefore to investigate how in particular (1) staff education/training and special skills such as the mastering of foreign languages, (2) trade fair activities, (3) particular logistics aspects related to the food product, (4) the use of international standardised business tools such as trade and payment terms and the handling of exchange rate risks, (5) the provision of foreign market information, and (6) the extent of government assistance affect success in international food product markets. The second aim is to find out whether, and to what extent, the perception of the importance of these problem areas differs across countries.

In order to answer these questions, a survey of international food product marketers from Germany and Australia was conducted. Australian companies may be seen as a valuable benchmark for German businesses, as they operate in a comparatively liberalised business environment which is seen by many economists as a future standard also for German companies (see e.g. SCHMITZ 1996) and which will also be a consequence of the future implementation of the WTO rules for the European market. Moreover, German companies could learn which particular problems the marketing of food products into the important and strongly growing Asian market brings, in which many Australian business have already been operating for some time. Australian managers, on the other hand, could learn from the German situation which particular challenges the European market has, especially with respect to the existing stringent nationally different food legislations and its tendency to consumer protectionism.

The structure of this section is as follows: in the following paragraph, the questionnaire design and the conduction of the survey is described. Then, the methodology of analysis, which was used to evaluate the survey data, will be discussed. The fourth section will present in detail the research findings of the survey. Finally, some conclusions will be drawn and directions for future research will be given.

3.2.1 Questionnaire design and carrying out of survey

The questionnaire design resulted from the theoretical analysis discussed in the previous section. The questionnaire structure reflects thus the principal problem areas which were found to occur in the international marketing of food products. A total of 59 questions (58 in the Australian questionnaire) arranged in 8 main categories were asked using a paper questionnaire comprising 12 A5-formatted pages (see Appendix for a copy). The individual questions will be discussed in detail in the following sections. In most questions the choices needed either to be ticked with a cross or a figure had to be filled into a corresponding field. Only one question was formulated in an open way where the respondents could write down their opinions concerning the asked topic. 5-grade rating scales were used, where 1 always signified the lowest, 3 the mean and 5 the highest value. The 5-grade rating scale was preferred to a 7-grade rating scale because the former offers the advantage of attributing a realistic word meaning to every grade on the scale, thus facilitating the interpretation of the meaning of each grade for the respondent. Since the survey was held in Germany and Australia, two versions, one in German and one in English were produced.

The testing and optimisation of the questionnaire was done in the following way: the German version was presented to and discussed with 13 Ph.D.-students and two professors of the *Justus-Liebig University of Giessen*. The questionnaire was then pre-tested on three practitioners, but their remarks necessitated no major changes. After the survey was conducted in Germany the questionnaire was translated into English and adapted to the particularities of the Australian business environment. In general, it was tried to keep the English translation as close as possible to the German version in order to assure the comparability of the results. The translated version was given to several researchers of *The University of Adelaide* for proof-reading and testing of comprehensiveness before it was sent out to Australian companies.

The German survey took place in December 1998. For this survey the following method was used in order to meet the given survey budget. First, contact details from 828 German food manufacturing and trading companies were randomly selected from several CD-ROM databases (ANUGA trade fair participants 1997, D-INFO 1998 address register, etc.). Only companies with fax numbers in the address data set were chosen. These companies were contacted via fax in November 1998 and asked whether they would be interested in participating in the survey. A total number of 728 faxes could be transmitted to the companies within 3 trials during one week. Out of these 728 companies 123 returned the fax specifying a respondent with contact details and thus agreed to receive a paper questionnaire via ordinary mail. One week before the closing date the respondents who had not yet returned the questionnaire were contacted again via fax to remind them of the approaching deadline. A total number of 91 usable questionnaires were finally returned. Out of these, 9 questionnaires had to be excluded from the evaluation because it was not possible to classify the companies clearly as either manufacturers or traders since the companies indicated to do both at the same time. As a result, this survey method yielded 82 usable questionnaires from German companies, giving a response rate of 11.3% out of the 728 contacted companies.

The Australian survey took place in June 1999. 570 contact details of companies engaging in the international marketing of food products were selected from the AUSTRADE website (www.austrade.gov.au), the Australian trade promotion agency. However, as no fax numbers were available, the questionnaires were sent directly by ordinary mail to all of these companies. A reminder

postcard was sent to the companies which had not yet returned the questionnaire one week before the closing date. A total number of 93 questionnaires were returned from which only 84 could be included in the final evaluation for the same reason as for the German survey. This yielded a response rate of 14.7%. Given the very similar sample sizes, the efforts made to assure a close questionnaire translation, and the fact that both surveys were conducted within a delay of only a few months, the survey data may be considered as sufficiently comparable from a methodological point of view.

Table 45: Industry sizes, companies contacted and questionnaires returned in both surveys

	<i>Germany</i>	<i>Australia</i>	<i>Total</i>
Total no. of companies in the industry*	5 911†	3 390‡	9 301
Companies contacted	728	570	1 298
Questionnaires returned	91	93	184
Questionnaires used in the final evaluation	82	84	166
Response rate (%)	11.3	14.7	12.8

Notes: * Manufacturing companies only; † 1998; ‡ 1998/99.

Sources: Bundesvereinigung der Deutschen Ernährungsindustrie (German food industry association), www.ang-online.de/bvedaten.htm;
Department of Agriculture, Fisheries and Forestry Australia (AFFA), *Australian Food Statistics 2001*, p.41;
Author's compilation from questionnaire responses.

The representativeness and generaliseability of the survey results must be viewed cautiously, however. The food manufacturing sector is in most countries still a very large one which, because of the small company sizes, in general consists of a great number of businesses. As Table 45 shows, the number of food manufacturing companies in the mid-nineties was almost 6 000 in Germany and more than 3 000 in Australia. Given this fact, it becomes clear that the number of companies included in this survey represents only a small percentage of the sector.⁹⁸ From a statistical point of view, a sample size of just over 80 for each country is also rather at the lower end of the minimum sample sizes required for meaningful statistical interference. Although these critical minimum sample sizes depend on the specified *power level*, the expected *effect sizes* and the chosen *alpha values*, meaningful statistical interference is in general only possible with sample sizes at least greater than 100 observations (HAIR *et al.* 1998, pp.11-13).⁹⁹ In the context of this survey, statistical interference of the results can therefore only be

⁹⁸ This is even more true considering the fact that the survey included also food *trading* companies which are not included in the above figures of the sector sizes.

⁹⁹ The *power* of a statistical interference test is the probability of $1-\beta$ where β is the *type II error* or *beta*. Power is the probability of correctly rejecting the null hypothesis when it should be rejected. Thus, power is the probability that statistical interference will be indicated if it is present (HAIR *et al.* 1998, p.11). Power is determined by three factors: (1) α or *alpha*, i.e. the *type I error*, which gives the probability of rejecting the null hypothesis when it is actually true, or the chance of the test showing statistical interference when it actually is not present (*ibid.*, p.10). α and β are inversely related, with the consequence that reducing the type I error reduces automatically the power of the statistical test. (2) *effect size* (ES), i.e. the estimate of the degree to which the phenomenon being studied (e.g. the correlation or the difference in means) exists in the population (*ibid.* p.2). Effect sizes are defined in standardised terms, i.e. mean differences are stated in terms of standard deviations (e.g. an effect size of 0.5 indicates that the mean difference is one-half of the standard deviation). Typically, small ES are defined at around 0.2, moderate ES at around 0.5 and large ES at around 0.8 (*ibid.*, p.12). As one would expect, a larger effect is more likely to be found than a smaller effect, and thus to impact the power of a statistical test (*ibid.*, p.11). The researcher must be aware of the fact that in order to

expected if the investigated research issues can be assumed to be consistent in both countries, i.e. the country bias in the results between the two samples is small. This, however, should *a priori* be the case, as the purpose of this study is to identify structural success factors *specific to the food industries*, i.e. specific to the sector and not to the country. Thus, the combined sample size of over 160 cases should be sufficiently large for significant statistical interference. Finally, a sample size of 166 observations is — in absolute terms — still a lot, which, in any case, should be enough to produce *interesting* results in their own right, even if the number of analysed companies seems small relative to the sector.

3.2.2 Methodological considerations

The general research methodology of this survey is that of an expert interrogation. That is, the intention was to ask professionals working in the international marketing of food products to give their opinions on selected relevant issues which emerged from previous theoretical and empirical analysis. This led to a sample of answers from highly qualified people who expressed their work experience in completed questionnaires. The evaluation of the sample then looked for similarities or significant differences between the ratings on the individual questions in order to identify coherent opinion patterns.

The subdivision of the sample data into different groups can be seen as a logical consequence of the structure of the data set. Thus, apart from an overall evaluation using the whole sample, the data were analysed separately for Australian and German responses. Moreover, the sample was also analysed separately for manufacturing and trading companies. Finally, the data set was split even further into German manufacturers and traders, and Australian manufacturers and traders. This gives as a whole nine sub-samples for which individual analysis was performed. Such a fine subdivision of the data should therefore allow to check for country homogeneity and to identify differences resulting from the business class (manufacturer or trader) to which a company belongs.

Multivariate analysis techniques were used for the evaluation of the results. Apart from tests of differences in group means (*t*- and *F*-tests, non-parametric tests, and cross-tabulation and chi-square (χ^2) tests), factor analysis, cluster analysis, and multiple discriminant analysis techniques were applied to the data where it seemed to yield useful results. The analysis was performed using SPSS 10.0. In the following, the employed multivariate statistical analysis techniques are described in more detail.

establish statistical interference of small effects, a much bigger sample size is needed than for large effects. (3) *Sample size* itself determines the power of the statistical test. At any given α level increased sample sizes always produce greater power with the consequence that with very large sample sizes almost every effect (i.e. even very small ones at about 0.01) will become significant (*ibid.*, p.11-12). This implies that with very large sample sizes (i.e. 1 000 or more cases) (*ibid.*, p.164-65), almost every variation in the data becomes significant, making the test overly sensitive and thus not producing useful results anymore. On the other hand, with larger sample sizes the sample will become more representative of the population, and the variation of the estimated coefficients will become smaller. This is true until the analysis is estimated using the population. Then there is no need for significance testing because the "sample" is equal to — and thus perfectly representative of — the population (*ibid.*, p.182). In summary, however, it should be clear that statistical power and significance testing are not enough to assess the validity, meaningfulness and usefulness of quantitative research results. Their *practical significance*, i.e. whether the results are "substantial enough to warrant action" (*ibid.*, p.3) must also always taken into consideration.

3.2.2.1 Testing for group differences

The identification of significant group differences in the ratings on important aspects is one of the main purposes of this empirical investigation. A significant difference in the means of the responses of sub-samples indicates underlying structural dissimilarities which could be a cause for e.g. a possible lower export performance of German as compared to Australian companies. *Significant* in this context means that the identified difference is generaliseable, i.e. that it is very likely (i.e. with only 1%, 5% or 10% error probability, depending on the adopted confidence level) that the identified difference does exist in the population, and that it is not only found accidentally in the sample. That is, an identified significant difference is very likely to be present in reality and it is not only due to sampling variation. Significance testing is particularly useful when apparently important differences are identified but these are based on fairly small samples. In these cases the chances that the result simply reflects sampling variation is relatively high.

The mechanics of significant tests is to calculate a test value from the sample data which is compared to a theoretical 'critical' value derived from an assumed underlying distribution of the population. Very often the sample data needs to meet some assumptions, such as normality and/or homogeneity of the group variances ('homoscedasticity'). The null hypothesis (H_0) is in general that there is no differences between two (or more) values. If the calculated test value is higher than the critical value, then H_0 is rejected, i.e. there is a significant difference between the two (or more) values being tested. In so-called 'non-parametric tests' no particular distribution of the data has to be assumed and the sample data does not need to fulfil important restrictions, which makes these tests more universally applicable. On the other hand, many non-parametric tests are highly sophisticated statistical procedures which often demand advanced statistical software and powerful computers. In the following, the most commonly used tests for assessing group differences and their underlying assumptions are discussed.

The *t*-test is probably the most commonly used test for assessing group differences, however it is also the most restrictive one in its assumptions concerning the underlying data. In general, the data needs to be of metric scale, normally distributed and the group variances need to be homoscedastic (see HAIR *et al.* 1998, pp.331-2).¹⁰⁰ Moreover, there are different *t*-tests, depending on the exact purpose of the analysis and the sample structure: (i) the *one-sample t-test* which tests whether the mean of a single variable differs from a specified constant; (ii) the *independent-sample t-test* which compares means for two groups of cases; and (iii) the *paired-samples t-test* which compares the means of two variables (e.g. two products or two measurements at different points of time) for a single group. For the purpose of this study, however, the independent-sample *t*-test will be mostly used, in cases where the data was tested positively to fulfil the necessary assumptions.

¹⁰⁰ SPSS provides the *Kolmogorov-Smirnov test* to check for the hypothesis that a sample comes from a normal distribution. The value of the Kolmogorov-Smirnov *Z* is based on the largest absolute difference between the observed and the theoretical cumulative distributions (SPSS 1999, p.826f.). In order to test for the equality of group variances, SPSS provides the *Levene test*, a homogeneity-of-variance test that is less dependent on the assumption of normality than most other tests. For each observation, the program computes the absolute difference between the value of that observation and its cell mean and performs a one-way analysis of variance on those differences. A second test that is available in SPSS is the *Box's M test* for the equality of the group covariance matrices. For sufficiently large samples, a non-significant *p* value means there is insufficient evidence that the matrices differ. However, the test is sensitive to departures from multivariate normality (see HAIR *et al.* 1998, p.240f.).

F-test or analysis of variance (ANOVA) are statistical procedures to test for differences in group means in the case of more than two groups. Thus, this technique is an extension of the two-sample *t*-test. Although one could imagine calculating separate *t*-tests for the differences between each pair of groups, it has been shown that these multiple *t*-tests inflate the overall type I error rate (see Footnote 99) (HAIR *et al.* 1998, p.332). ANOVA avoids this type I error inflation by determining in a *single* test whether the entire set of sample means are all equal at the same time, e.g. $H_0: \mu_1 = \mu_2 = \mu_3 = \dots = \mu_k$. For this a test value — the so-called *F*-value — is calculated from the sample data which is the quotient of the estimates for the *between-groups variance* and the *within-groups variance* (see *ibid.*, p.333). The null hypothesis is rejected as soon as the test value is greater than the theoretical critical *F*-value. However, although the *F*-test assesses the null hypothesis of overall equal means, it does not address the question of which means are different. In order to assess these differences, so-called *post hoc tests* have been designed. These tests provide abundant diagnostic information, but they also inflate the overall type I error rate by performing multiple statistical tests and thus must use very strict confidence levels (*ibid.*, pp.356-7). ANOVA can only be used for quantitative (metric) data, however the test is robust against deviations from normality of the data (*ibid.*).

Non-parametric tests offer the advantage of not requiring particular assumptions concerning the distribution and the quality of the variable to be compared between groups. As before, there are different tests for the 2-groups and the *k*-groups case. The *Mann-Whitney U test* is the most popular of the 2-independent-samples tests. It is equivalent to the Wilcoxon rank sum test and the Kruskal-Wallis test for two groups. Mann-Whitney tests that two sampled populations are equivalent in location. The observations from both groups are combined and ranked, with the average rank assigned in the case of ties. The number of ties should be small relative to the total number of observations. If the populations are identical in location, the ranks should be randomly mixed between the two samples. The number of times a score from group 1 precedes a score from group 2 and the number of times a score from group 2 precedes a score from group 1 are calculated. The Mann-Whitney *U* statistic is the smaller of these two numbers.¹⁰¹ The Mann-Whitney *U* tests requires data which is at least of ordinal scale. The *Kolmogorov-Smirnov Z test* for 2-independent-samples is a more general test than the Mann-Whitney *U* test and detects differences in both the locations and the shapes of the distributions. The Kolmogorov-Smirnov test is based on the maximum absolute difference between the observed cumulative distribution functions for both samples. When this difference is significantly large, the two distributions are considered different. Thus, the test is sensitive to any type of difference in the two distributions: shape, location, etc. In cases of more than two groups, the *Kruskal-Wallis H test*, the non-parametric equivalent to ANOVA, can be used. Kruskal-Wallis tests whether several independent samples are from the same population. It requires data of at least ordinal scale and assumes that the underlying variable has a continuous distribution and that the samples to be tested are

¹⁰¹ In order to determine the level of significance for non-parametric tests, SPSS (in its module 'exact tests') offers three possibilities: (i) *asymptotic only*, (ii) *Monte Carlo simulations*, or (iii) *exact significance*. Asymptotic significance, i.e. the standard method which compares calculated test values to an assumed theoretical pre-tabulated distribution, requires large samples and densely filled data tables. The calculation of the exact significance, on the other hand, is very computing-intensive and time-consuming so that even today's powerful computers may fail to produce results in large samples. The Monte Carlo simulation method can be seen as a good compromise between the two techniques, as it can be applied to large data sets but does not require particular assumptions concerning the underlying data. However, the determined significance level is less accurate than the 'exact' one.

similar in shape. To sum up, non-parametric tests are powerful and widely applicable statistical procedures which makes them a useful analysis tool despite their underlying sophisticated computing methods.

Chi-square (χ^2) testing and cross-tabulation are appropriate analysis techniques of group differences when the variable to be analysed is of nominal scale. The chi-square test tabulates a variable into categories and computes a chi-square statistic. This goodness-of-fit test compares the observed and expected frequencies in each category to test either that all categories contain the same proportion of values or that each category contains a user-specified proportion of values. Cross-tables can be formed as two-way and multi-way tables. The structure of the table and the scale of the data determine the test or measure to be used. For tables with two rows and two columns, there are *Pearson chi-square*, the *likelihood-ratio chi-square*, *Fisher's exact test*, and *Yates' corrected chi-square*. For 2x2 tables, Fisher's exact test can be computed when a table, that does not result from missing rows or columns in a larger table, has only one cell with an expected frequency of less than 5. Yates' corrected chi-square can be computed for all other 2x2 tables. For tables with any number of rows and columns, the Pearson chi-square and the likelihood-ratio chi-square can be used. For nominal data, test measures based on the chi-square statistics are: the *phi (ϕ) coefficient*, *Cramer's V*, the *contingency coefficient (cc)*, or *lambda (λ)*.¹⁰² These measures indicate the strength of the relationship between the two or more cross-tabulated variables.

The different test procedures which exist to assess group differences are summarised in Table 46. The selection of a certain test depends on the number of groups to be analysed (2 or more) and on the quality of the data of the variable used for comparison between the groups.

Table 46: Tests for group differences in 2- or k-independent samples depending on data quality

Quality of data	No. of groups	
	2	3 or more
Metric — normally distributed / variance homogeneity	<i>t</i> -test	<i>F</i> -test (ANOVA)
Metric — non-normally distributed / variance heterogeneity	Mann-Whitney- <i>U</i> -test	Kruskal-Wallis- <i>H</i> -test
Non-metric — ordinal	Mann-Whitney- <i>U</i> -test	Kruskal-Wallis- <i>H</i> -test
Non-metric — nominal	Chi-square (χ^2)	Chi-square (χ^2)

Source: Author's draft.

¹⁰² *Phi* is a chi-square based measure of association that involves dividing the chi-square statistic by the sample size and taking the square root of the result. *Cramer's V* is a very similar measure of association which only differs from *phi* in the case of multi-way tables. The *contingency coefficient* is always between 0 and 1, but it is not generally possible for it to attain the value of 1. The maximum value possible depends on the number of rows and columns in a table. *Lambda* reflects the reduction in error when values of the independent variable are used to predict values of the dependent variable. A value of 1 means that the independent variable perfectly predicts the dependent variable. A value of 0 means that the independent variable is no help in predicting the dependent variable (see BACKHAUS *et al.* 1996, p.178-80).

3.2.2.2 Factor analysis

Factor analysis is a multivariate statistical analysis technique used to condense or to summarise the information contained in a large number of variables (HAIR *et al.* 1998, p.88). Variables are bundled into a smaller set of factors each representing an underlying dimension. Also, factor analysis determines the extent to which each variable is explained by each dimension. Thus, the two primary uses of factor analysis — summarisation and data reduction — are achieved (*ibid.*, pp.90-91). Factor analysis can be used for exploratory or confirmatory research purposes. Unknown data structures can be explored and described by using factoring techniques. On the other hand, factor analysis can also be used in order to confirm hypothesised data patterns.

The underlying concept of factor analysis is that variables which are sufficiently correlated with each other express the same information and can thus be summarised into a single factor. Reducing the number of variables into a few factors has not only the advantage of limiting the amount of variables to deal with, but the resulting factors are also independent of each other, thus representing real dimensions, and reducing multicollinearity problems. Variables that are used in factor analysis should be of metric measurement, and there must be sets of variables which have at least some degree of correlation among each other (>0.3) (HAIR *et al.* 1998, p.99). As a general rule, a minimum of at least five observations for each variable to be analysed should be available, with any more improving the results considerably (*ibid.*). Factor analysis is not a dependency technique, it merely explores existing data pattern and bundles the information. Thus, factor analysis will always produce results, even if there is no rational explanation for them. This requires that factor analysis is applied with great care and with clear *a priori* expectations about the underlying data structure. Moreover, whenever differing groups are expected in the sample, separate factor analysis should be performed, and the results should be compared to identify differences not reflected in the results of the overall sample (*ibid.*, p.100).

The two main models used to obtain factor solutions are (i) *common factor analysis*, or (ii) *component (or principle components) analysis* (HAIR *et al.* 1998, pp.100-103). The two models differ in the type of variance used in the calculation process. Component analysis considers the total variance which exists in the variables, whereas common factor analysis considers only the shared, or common, variance among the variables (*ibid.*).¹⁰³ Both models are widely used, however, the component analysis has — although it is considered as more theoretically based — some problems (*ibid.*). First, common factor analysis suffers from factor indeterminacy, meaning the model gives no single unique solution but several similar ones. Second, the calculation of this model can take substantial computing power and time. Third, the calculated *communalities*, i.e. the total amount of variance that the variables share with all other variables in the analysis, are not always estimable or may be invalid, which may lead to the deletion of variables from the analysis. These drawbacks of common factor analysis have made the principle components model the preferred one. However, in any case, empirical research has demonstrated similar results for both models in many instances (*ibid.* p.103).

¹⁰³ *Common variance* is defined as that variance in a variable which is shared with all other variables in the analysis. *Specific variance* is associated with only a specific variable. *Error variance* is the variance due to unreliability in the data-collection process, measurement error, or a random component in the measured phenomenon (HAIR *et al.* 1998, p.100-101).

The number of factors to extract is one of the most important decisions in factor analysis, and since a quantitative method for determining exactly this numbers has not yet been developed, this problem is subject to a great deal of arbitrary judgement. The decision must be taken carefully, as there are negative consequences for selecting either too many or too few factors to represent the data. Despite the lack of precise tests, there are some 'stopping rules' for the number of factors to be extracted. The *latent root criterion* is the most commonly chosen technique which can be used for either component or common factor analysis. Here it is assumed that any individual factor should account for the variance of at least a single variable if it is to be retained for interpretation. Thus, only factors having *latent roots* or *eigenvalues*¹⁰⁴ greater than 1 are considered significant, the other variables are disregarded. Using the eigenvalues for establishing a cut-off is most reliable when the number of variables is between 20 and 50. If the number of variables is less than 20, there is a tendency of this method to extract too few factors, whereas if more than 50 variables are included too many factors might be extracted (*ibid.*, p.104). The *percentage of variance criterion* is based on achieving a specified cumulative percentage of total variance extracted by successive factors. There is no absolute threshold. However in the social sciences — where information is often less precise — it is not uncommon to stop the factoring procedure when the extracted factors account for not more than 60% of the total variance (*ibid.*). The *a priori criterion* can be applied when there is already exact knowledge of how many factors there should be. The researcher than simply instructs the computer to stop the analysis when the desired number of factors has been extracted. The *scree test criterion* is based on the eigenvalues as well. Here these values are plotted against the number of factors in their order of extraction, and the shape of the resulting curve is used to evaluate the cut-off point. The point at which the curve first begins to straighten out is considered to indicate the maximum numbers of factors to extract. In general, the scree test results lead to at least one more factor to be considered for inclusion than the latent root criterion. In practice, several criteria should used to decide on the number of factors to be included in the final solution, and the practical significance of the factor solution needs also to be assessed.

The interpretation of the factor solution usually involves several steps. First, the initial unrotated factor matrix is computed which gives a preliminary indication of the number of factors to extract (HAIR *et al.* 1998, p.106). The matrix contains factor loadings for each variable in each factor. In computing the unrotated factor matrix, a combination of factors is extracted, where the first factor is a linear combination of the original variables which account for most of the variance in the data. The second factor is then a linear combination of variables that account for most of the residual variance after the effect of the first factor has been removed from the data. Subsequent factors are calculated similarly until all the variance in the data is exhausted (*ibid.*). Thus, unrotated factor solutions achieve the objective of data reduction, but they do not provide information that offers the most adequate interpretation of the variables under examination. Generally, rotation simplifies the factor structure and thus facilitates interpretation of the factors. The second step will then be to rotate the extracted factors, i.e. to redistribute the variance

¹⁰⁴ The *eigenvalue* (or latent root) is the column sum of squared loadings for a factor, where a *factor loading* is the correlation between the original variables and the factor. Squared factor loadings indicate what percentage of the variance in an original variable is explained by a factor. Thus, the eigenvalue represents the amount of variance accounted for by a factor (HAIR *et al.* 1998, p.89). In practice, factor loadings should at least be greater than ± 0.30 in order to be considered practically significant (though the significance level depends also on the sample size: the larger the sample the more significant the loading will be). A ± 0.30 loading translates to approximately 10% of the variance explained, and a ± 0.50 loading denotes that 25% of the variance is accounted for by the factor.

from the first extracted factors to the later ones in order to achieve a simpler, and theoretically more meaningful factor pattern (*ibid.*, p.107). There are about half a dozen different rotation methods, but one of the most frequently used is the VARIMAX rotation¹⁰⁵. A VARIMAX rotation will yield a factor structure where the individual factors are clearly separated from each other, thus making the interpretation of the underlying dimensions easier. The third step involves assessing whether the obtained factor results are sufficiently accurate and practically meaningful, or whether the factor analysis should be repeated with different variables included or with a different rotation method. Statistical significance can be assessed in examining factor loadings for each variable (which in samples of less than 100 observations should at least be greater than ± 0.30 , see also Footnote 104). A second measure to assess statistical significance are the communalities of each variable (*ibid.*, p.113). For example, one can specify that at least one-half of the variance of each variable must be taken into account by the factor solution what causes variables with communalities of less than 0.50 to be excluded from the analysis. A final step in the interpretation of a factor solution is to find factor *labels*, i.e. to assign some meaning to the pattern of factor loadings. This step can only be done intuitively by the researcher and the process will mostly be based on his/her perception of how the factor solution represents the underlying dimensions of a given research context.

Factor scores are composite measures created for each observation on each factor extracted in the factor analysis (HAIR *et al.* 1998, p.89). The factor weights are used in conjunction with the original variable values to calculate each observation's score. The factor scores can then be used to represent the factor(s) in subsequent analyses. Factor scores are standardised to have a mean of 0 and a standard deviation of 1. Conceptually the factor score represents the degree to which each individual variable scores high on the group of variables that have high loadings on a factor. Thus, variables with high loadings will be given higher factor scores. In practice, factor scores are generally calculated by using regressions. To sum up, factor scores are calculated if the factor results need to be used in subsequent analysis, such as cluster of discriminant analysis.

In summary, factor analysis is a multivariate statistical analysis technique used to condense the information contained in a large number of variables which are bundled into a smaller set of factors representing underlying dimensions. Thus the two primary uses of factor analysis — summarisation and data reduction — are achieved. Variables used in factor analysis should be of metric measurement, and there must be sets of variables which have at least some degree of correlation among each other (>0.3) so that these sets can be transformed into factors. There are two main models used to obtain factor solutions (i) *common factor analysis*, or (ii) *component (or principle components) analysis* which differ in the type of variance that they use in the calculation process. In practice, principle component analysis is usually the preferred method. Several criteria exist to extract the 'correct' number of factors, but all of them can only give an indication, and practical significance should always be assessed too when decisions on the number of factor to be extracted are made. The interpretation of the factor solution involves several steps, from

¹⁰⁵ VARIMAX is an *orthogonal* rotation method which treats all factors as independent of each other so that their axes are maintained at 90 degrees. In effect, the correlation between the factors is determined to be zero. The result is a very clear image of the factor structure. The other group of rotation methods are *oblique* rotations, where the extracted factors are correlated with each other. These solutions are more realistic, as in practice very few factors are uncorrelated, but they are also more difficult to interpret (see HAIR *et al.* 1998, p.110-111 for details).

extracting an unrotated factor solution, via rotation, to the labelling of the finally accepted factors. Factor scores can be calculated in order to use the factors, instead of the original variables, in subsequent analysis.

3.2.2.3 Cluster analysis

Cluster analysis is the name given to a group of multivariate interdependence techniques whose primary purpose is to group objects based on the characteristics they possess (HAIR *et al.* 1998, p.473). Objects are classified in a way that the resulting clusters exhibit high internal (within-cluster) homogeneity and high external (between-cluster) heterogeneity. Thus, when plotted geometrically, the objects within clusters will be close together, and different clusters will be far apart (*ibid.*). The focus of cluster analysis is on the comparison of objects based on the cluster variate, i.e. the set of variables representing the characteristics used to compare the objects, not on the estimation of the variate itself. This makes an accurate definition of the variate a critical step in cluster analysis. Cluster analysis is comparable to factor analysis in its objective of assessing structure. But the two techniques differ in that cluster analysis groups objects, whereas factor analysis is primarily concerned with grouping variables (*ibid.*).

The problems involved in cluster analysis result from the fact that it is primarily an exploratory technique. It can be characterised as descriptive, atheoretical, and noninferential (HAIR *et al.* 1998, p.474). It has no statistical basis upon which to draw statistical inferences. The solutions are not unique, as the cluster membership for any number of solutions is dependent on many elements of the procedure (such as clustering algorithm, standardisation of the data, and/or the existence of outliers), and many different solutions can be obtained by varying one or more elements. Moreover, cluster analysis will always create clusters, regardless of the 'true' existence of any structure in the data. Finally, the cluster solution is totally dependent on the variables selected as a basis for the similarity measure. The addition or deletion of relevant variables can have a substantial impact on the resulting solution. Thus cluster analysis, along with factor analysis, is much more an art than a science (*ibid.*, p.482).

The procedure of cluster analysis demands that at least three steps are performed in order to obtain a solution: (i) a measure for assessing 'interobject similarity' needs to be defined, (ii) a method for forming the actual clusters, i.e. the clustering algorithm, needs to be selected, and (iii) the number of the clusters in the final solution must be determined. An initial step may also involve the standardisation of the data and the detection and deletion of outliers, as cluster results are very sensitive to the scales the variables are measured and to the influence of outliers (HAIR *et al.* 1998, p.482). In the following, these steps are described in more detail.

Interobject similarity can be measured in different ways, with the three methods most frequently employed being (1) correlational measures, (2) distance measures, (3) and association measures. The first two measures require metric data, whereas the third one can also be used for non-metric data (HAIR *et al.* 1998, p.484). There are half a dozen different measures, however one of the most

recommended ones is *Mahalanobis distance* (D^2) — a distance measure — or the *squared Euclidean distance* in case D^2 is not available in the computer software package used for the calculations (*ibid.*, p.488).¹⁰⁶

Clustering algorithms can be divided into two main categories: (1) hierarchical and (2) non-hierarchical ones. The *hierarchical procedures* involve the construction of a hierarchy, i.e. a treelike structure (also called *dendrogram*) which depicts the formation of the clusters. In this method, each object starts out as its own cluster. In subsequent steps, the two closest clusters are combined into a new aggregate cluster, thus reducing the number of clusters by one in each step. In some cases, a third object joins the first two in a cluster. In other cases, two groups of objects formed at an earlier stage may join together in a new cluster. Eventually, all objects will be grouped into one final large cluster. The main disadvantage with this method is that once an object is assigned into a cluster it will stay there even if later occurring cluster solutions would rather necessitate it to change its membership. That is, this method is rather inflexible. There are five popular hierarchical clustering algorithms: (1) single linkage, (2) complete linkage, (3) average linkage, (4) Ward's method, and (5) centroid method. These algorithms differ in how the distance between clusters is computed (*ibid.*, pp.494-95).¹⁰⁷ The *Ward's method* may be generally the most frequently used algorithm. *Non-hierarchical* - or *K-means* - *clustering procedures* do not involve the tree-like construction process. Instead, they assign objects into clusters once the number of clusters to be formed is specified (*ibid.*, p.496). Thus, for example, a six-cluster solution is not just a combination of two clusters from the seven-cluster solution, but is based only on finding the best six-cluster solution. A first step in this procedure demands the selection of a cluster seed as initial cluster centre, and all objects within a pre-specified threshold distance are included in the resulting cluster. Then another cluster seed is chosen, and the assignment continues until all objects are assigned. Objects will be reassigned if they are closer to another cluster than the one originally assigned. As for the hierarchical procedures, there are several different methods for selecting cluster seeds and assigning objects. However, some statistical software packages (such as SPSS) do not give the user the choice between these different methods, thus making a detailed discussion about the pros and cons of each method useless (but see for a description HAIR *et al.* 1998, p.497). The major problem with non-hierarchical clustering procedures is how to select the cluster seeds since unfortunately the cluster solutions depend strongly on the initially specified cluster seeds. Probably the best — and least arbitrary — way is to determine cluster seeds by hierarchical cluster analysis, thus making a combination of both methods the most reliable way of clustering. That is, first, a hierarchical technique establishes the number of clusters and profile the cluster centres. Then, a non-hierarchical method will use these as initial cluster seeds and will 'fine-tune' the results by allowing the switching of cluster membership (*ibid.*, p.498).

¹⁰⁶ The *Euclidean distance* is a measure of the length of a straight line drawn between two objects (the length of the hypotenuse of a right triangle). The squared Euclidean distance has the advantage of not having to take the square root which speeds computation considerably. The *Mahalanobis distance* (D^2) is the standardised form of the Euclidean distance. Its calculation not only performs a standardisation process on the data by scaling in terms of standard deviations, but it also sums the pooled within-group variance-covariance, which adjusts for intercorrelations among the variables (HAIR *et al.* 1998, p.486-88).

¹⁰⁷ The *single-linkage method* is defined as the minimum distance between the closest objects in two clusters. In contrast, the *complete linkage method* uses the maximum distance between the most farthest objects of any cluster. The *average linkage method* uses the mean distance from all objects in one cluster to all objects in another cluster. *Ward's method* uses the sum of squares between two clusters summed over all variables. The *centroid method*, finally, measures the distance between cluster centroids, i.e. the mean value of all objects in one cluster. (See HAIR *et al.* 1998, p.493-96 for more information on the advantages and disadvantages of each method.)

The number of clusters to be formed is one of the most difficult questions in cluster analysis since, as in factor analysis, no standard, objective method or stopping rule exists (HAIR *et al.* 1998, p.499). Instead several criteria and guidelines have been developed for approaching the problem. The principal drawback is that these are *ad hoc* procedures and must be computed by the researcher, and very often this involves quite complex calculations (*ibid.*). One class of stopping rules that is relatively simple examines some measure of similarity or distance between clusters at each successive step, with the cluster solution defined when the similarity measure exceeds a specified value or when the successive values between steps make a sudden jump. Thus, one looks for large increases in the average within-cluster distance. When a large increase occurs, the prior cluster solution will be selected on the logic that its combination caused a substantial decrease in similarity. The *agglomeration coefficient* is particularly useful for such a stopping rule which evaluates the changes in the coefficient at each stage of the (hierarchical) clustering process. Small coefficients indicate that fairly homogenous clusters are being merged. Joining two very different clusters results in a large coefficient or a large percentage change in it. Thus, one looks for large increases in the value, similar to the scree test in factor analysis. This test has been shown to be a quite accurate algorithm, although it has the tendency to indicate too few clusters (*ibid.*, p.503). A second general class of stopping rules attempts to apply some form of statistical rule or to perform a statistical test, such as the point-biserial / tau correlations or the likelihood ratio (*ibid.*, p.499). Although some of these measures are included in statistical software packages, the measures seem overly complex for the improvement they provide over simpler measures (*ibid.*). In any case, in practice *a priori* criteria, practical judgement and common sense need to be considered too when a particular cluster solution is selected among a range of others.

The interpretation of clusters involves examining each cluster in terms of the cluster variate in order to name or to assign a label to it which accurately describes the nature of the cluster (HAIR *et al.* 1998, p.500). When starting the interpretation process, one measure frequently used is the profile of cluster centroids. Examining the average scores for each group on the variables underlying the cluster solution will usually yield a rich description for each cluster (*ibid.*). The profiling and interpretation of the clusters, however, achieve more than just description. First, they provide a means for assessing the correspondence of the derived clusters to those proposed by prior theory or practical experience. Second, the cluster profiles provide a route for making assessments of practical significance. Thus, in assessing either correspondence or practical significance, the derived cluster solution can be compared to a pre-conceived typology (*ibid.*).

In summary, cluster analysis is a multivariate interdependence technique whose primary purpose is to group objects based on the characteristics they possess in a way that the resulting clusters exhibit high internal (within-cluster) homogeneity and high external (between-cluster) heterogeneity. The procedure demands that at least three steps are performed: (i) the definition of a measure for assessing 'interobject similarity', (ii) the selection of a method for forming the actual clusters, i.e. the clustering algorithm, and (iii) a decision on the number of the clusters contained in the final solution. As measure of interobject similarity the most recommended one is Mahalanobis distance (or squared Euclidean distance). The Ward's method is one of the most frequently used hierarchical clustering algorithm, however best clustering results can be achieved if the cluster seeds — which this method yields — are used to fine-tune the cluster solution by a subsequent non-hierarchical (K-means) clustering procedure. As stopping rule, the agglomeration coefficient is particularly useful which indicates the changes in cluster heterogeneity at each stage of the

(hierarchical) clustering process. The cluster solution before the largest increase in its value should be used. Finally, the interpretation of a cluster solution involves the profiling of cluster centroids on the underlying variables. Thus, correspondence with a priori expectations and practical significance can be assessed.

3.2.2.4 Multiple discriminant analysis

Multiple discriminant analysis is a multivariate dependence technique that is used when the dependent variable is non-metric. In case the variable is dichotomous, i.e. it takes only two values, this technique is called discriminant analysis, when it multichotomous, i.e. it takes three or more (categorical) values, the technique is referred to as *multiple* discriminant analysis. Thus, discriminant analysis can be applied in situations where a relationship should be predicted or explained which impact the category in which an object is located (HAIR *et al.* 1998, p.240). In general, the relationship takes the general form:

$$Y_1 = X_1 + X_2 + X_3 + \dots + X_n \quad . \quad [3.2.2.4-1]$$

(nonmetric) (metric)

More specifically, this technique estimates a so-called *discriminant function*, i.e. a variate of the independent variables selected for their discriminatory power used in the prediction of the group membership. The predicted value of the discriminant function is the *discriminant Z score*, which is calculated for each object in the analysis. The discriminant function takes the form of the linear equation (*ibid.*, p.241)

$$Z_{jk} = a + w_1X_{1k} + w_2X_{2k} + \dots + w_nX_{nk} \quad [3.2.2.4-2]$$

where

Z_{jk} = discriminant Z score of discriminant function j for object k

a = intercept

w_i = discriminant weight for independent variable i

X_{ik} = independent variable i for object k .

Discriminant analysis is the appropriate statistical technique for testing the hypothesis that the group means, i.e. the centroids, of a set of independent variables for two or more groups are equal (HAIR *et al.* 1998, p.245). The test for statistical significance of the discriminant function is a generalised measure of the distance between group centroids. It is computed by comparing the distributions of the discriminant scores for the groups. If the overlap in the distribution is small, the discriminant function separates the groups well. If the overlap is large, the function is a poor discriminator between the groups (*ibid.*). If there are more than two groups in the dependent variable, discriminant analysis will calculate $NG - 1$ discriminant functions, where NG is the number of groups. Each discriminant function will calculate a discriminant Z score. Thus, in case of a three-group dependent variable, each object will have a score for each discriminant function, allowing the objects to be plotted in two dimensions, with each dimension representing a discriminant function (*ibid.*, p.246). The estimation procedure of discriminant analysis involves several steps (*ibid.*, pp.256-275). First, the available data need to be checked to assure that they meet the assumptions of discriminant analysis. Then, the computational method — simultaneous or stepwise estimation — has to be selected, the discriminant function(s) has/have to be estimated, and the overall fit and the statistical significance have to be assessed. Finally, the results need to be interpreted. In the following, these steps are described in more detail.

The assumptions of discriminant analysis refer to the scale of the variables, the sample size, and general model specifications. First, a decision must be made on how many groups should be used for the estimation procedure. In principle, there are two possibilities: the *polar extreme approach* involves only comparing the extreme two groups and excluding the middle group(s) from the discriminant analysis, or the use of all available groups in the estimation procedure (HAIR *et al.* 1998, p.257). The former approach may be useful when group differences are poor, which would result only in the estimation of insignificant separate discriminant functions. Decisions need also to be made on the independent variables included, as only those with sufficient discriminatory power should be used in the analysis. Discriminant analysis is quite sensitive to the ratio of sample size to the number of predictor variables (*ibid.*, p.258). The ratio should at least be 20 observations for each variable, otherwise the results may become unstable (*ibid.*). The recommended minimum size is five observations per independent variable (*ibid.*). In addition to the overall sample size, the sample size of each group needs to be considered too. At a minimum, the smallest group size must exceed the number of independent variables, but in practice, each group should at least have 20 observations (*ibid.*). Moreover, the groups should ideally be quite similar in size, otherwise the results may be biased (*ibid.*). Another important assumption is that the data (i.e. the independent variables) must meet multivariate normality. If this assumption is violated by most variables, the use of other estimation techniques, such as logistic regression, is advised (*ibid.*, p.259). Finally, multicollinearity between the independent variables should not be excessive and the relationship between the dependent and independent variables must be linear (*ibid.*).

The estimation of the discriminant functions demands as a first step that a decision on the method of estimation is made. Two computational methods can be utilised in deriving a discriminant function: the simultaneous (direct) method and the stepwise method (HAIR *et al.* 1998, p.260). *Simultaneous estimation* involves computing the discriminant function so that all of the independent variables are considered concurrently, i.e. it is computed based upon the entire set of independent variables, regardless of their discriminatory power (*ibid.*). This method is appropriate when — for theoretical reasons — there is a strong reason to include all variables in the analysis and not only the most discriminatory ones. *Stepwise estimation* involves entering the variables into the discriminant function one at a time on the basis of their discriminatory power. The estimation procedure begins by choosing the single best discriminating variable. This variable is then paired with each of the other independent variables one at a time, and the variable that is best able to improve the discriminating power of the function in combination with the first variable is chosen. The subsequent variables are selected in a similar manner. As additional variables are included, some previously selected ones may be removed if the information they contain about group differences is available in some combination of the other variables included in later stages (*ibid.*). The stepwise method is useful when a relatively large number of independent variables are to be considered for inclusion in the discriminant function. By sequentially selecting the next best discriminating variable at each step a reduced set of variables is identified which is typically as good — and sometimes even better than — the complete set of variables (*ibid.*, p.261). However, it should be noted that stepwise estimation becomes less stable and generalisable as the ratio of sample size to independent variable, falls below the recommended level of 20 observations per independent variable (*ibid.*).

Assessing statistical significance is the next step in the estimation procedure of discriminant analysis. After the discriminant function(s) has/have been computed, the level of significance must be

assessed, for which a number of statistical criteria is available (HAIR *et al.* 1998, p.262). One of the most commonly used measures is *Wilks' Lambda*, also called the maximum likelihood criterion or *U* statistics. It is a measure that examines whether group differences are somehow different without being concerned with whether they differ on at least one linear combination of the dependent variables (*ibid.*, p.351).¹⁰⁸ Another measure frequently used is the *chi-square* statistic (see Section 3.2.2.1). If the number of groups is three or more, what must be tested is not only if the discrimination between groups is overall statistically significant but also if each of the estimated discriminant functions is statistically significant (*ibid.*). All statistical software packages provide standard significance tests for accessing the significance of the estimated discriminant function(s).

The assessment of the overall fit of the discriminant function(s) usually involves three steps: the calculation of discriminant *Z* scores for each observation, the evaluation of group differences on the discriminant *Z* scores, and the assessment of the prediction accuracy of group membership (HAIR *et al.* 1998, p.263). *Z* scores are calculated using Equation [3.2.2.4-2]. This score — a metric variable — provides a direct means of comparing observations on each function. Observations with similar *Z* scores are assumed to be more alike on the variables constituting the discriminant function than those with disparate scores (*ibid.*). The evaluation of group differences can be done in comparing the group centroids, i.e. the average discriminant *Z* score for all group members (*ibid.*). A measure of success of discriminant analysis is its ability to identify discriminant function(s) that result in significantly different group centroids. There are standard tests available for assessing this difference. The assessment of group membership prediction accuracy is not possible by using conventional measures, such as R^2 (*ibid.*, p.264). Rather, each observation must be assessed as to whether it was correctly classified. This is because the statistical tests for assessing the significance of the discriminant function do not tell how well the function predicts.¹⁰⁹ To determine the predictive ability of a discriminant function, classification matrices must be constructed (*ibid.*). These matrices are created by cross-tabulating actual group membership with predicted group membership, where the numbers on the diagonal represent correct classifications, and off-diagonal numbers represent incorrect classifications (*ibid.*, p.241). Several criteria exist in order to assess whether the classification achieved by the estimated discriminant model is significantly better than a pure chance classification. The most commonly used are the proportional chance criterion and Press's *Q* statistic. The *proportional chance criterion* is used when group sizes are unequal and it is calculated as the sum of the squared proportions of all groups, i.e. $C_{PRO} = \sum_{i=1}^K \left(\frac{n_i}{N} \right)^2$, with K = number of groups, n_i the number of observations in group i , and N = total sample size. This percentage value is compared to the value of correct classification that would be expected by chance. No precise decision rules have been developed, but in general, the classification accuracy should be at least 25% higher than that achieved by chance (*ibid.*, p.269). *Press's Q statistic* is a statistical test for the discriminatory power of the classification matrix when compared with the chance

¹⁰⁸ *Wilks' Lambda* is calculated using the formulation $|W|/|W+A|$, where $|W|$ is the discriminant (a single number) of the sum of W and A , A being the between-groups multivariate dispersion matrix. The larger the between-groups dispersion, the smaller the value of *Wilks' Lambda* and the greater the implied significance. Although the distribution of *Wilks' Lambda* is complex, good approximations for significance testing are available by transforming it into an *F* statistic (HAIR *et al.* 1998, p. 351).

¹⁰⁹ With sufficiently large sample sizes, the group means (centroids) could be virtually identical, and there would still be statistical significance. Thus, the level of significance is a poor indication of the function's ability to discriminate between groups (HAIR *et al.* 1998, p.264).

classification (*ibid.*, p.270). This measure compares the number of correct classifications with the total sample size and the number of groups. The calculated value is then compared with a critical value (the chi-square value for one degree of freedom at the chosen confidence level). If it exceeds this critical value, then the classification matrix can be seen as statistically better than chance. The Q statistic is calculated by using the formula: $Press's\ Q = \frac{[N - (nK)]^2}{N(K - 1)}$, where N = total sample size, n = number of observations correctly classified, and K = number of groups.

The interpretation of the results involves the determination of the relative importance of each independent variable in the analysis. There are three commonly used measures to assess this importance: (i) standardised discriminant weights, (ii) discriminant loadings (structure correlations), and (iii) partial F values (HAIR *et al.* 1998, p.272). *Discriminant weights*, the w_i in Equation 3.2.2.4-2 (sometimes also referred to as discriminant coefficients), express the relative contribution of its assigned variable to that function. Independent variables with relatively larger weights contribute more to the discriminatory power of the function than do variables with smaller weights. The sign of the weight denotes only that the variable makes either a positive or negative contribution (*ibid.*). Thus, small absolute weights indicate that its corresponding variables are irrelevant in the analysis. However, discriminant weights are subject to considerable instability (*ibid.*). *Discriminant loadings* (or structure correlations) measure the simple linear correlation between each dependent variable and the discriminant function (*ibid.*). Thus the loadings reflect the variance that the independent variables share with the discriminant function and they can be interpreted like factor loadings in assessing the relative contribution of each independent variable to the discriminant function (*ibid.*). Discriminant loadings are less unstable than discriminant weights and they are considered as more valid than weights as a means of interpreting the discriminant power of independent variables because of their correlational nature (*ibid.*). *Partial F values* are another measure of assessing the relative discriminating power of independent variables which is, however, only available in the stepwise calculation method. The F values are calculated for each variable entering the estimation procedure. Large values indicate greater discriminatory power. In practice, rankings of independent variables using the F values approach are the same as the ranking derived from using discriminant weights, but the F values indicate associated levels of significance for each variable (*ibid.*, p.273).

In summary, (multiple) discriminant analysis is a multivariate dependence technique used when the dependent variable is non-metric. It can be applied in situations where a relationship should be predicted or explained which impact on the category in which an object is located. A so-called discriminant function will be estimated, i.e. a variate of the independent variables selected for their discriminatory power used in the prediction of the group membership. In case there are more than two groups in the dependent variable, $NG - 1$ discriminant functions will be calculated, where NG is the number of groups. Also, discriminant analysis is the appropriate statistical technique for testing the hypothesis that the group means, i.e. the centroids, of a set of independent variables for two or more groups are equal. The estimation procedure of discriminant analysis involves several steps: First, the available data need to be checked to assure that they meet the assumptions of discriminant analysis. Then, a computational method — simultaneous or stepwise estimation — must be chosen, the discriminant function(s) has/have to be estimated, and the overall fit and the statistical significance has to be assessed. Finally, the results must be interpreted.

3.2.3 *Survey results*

This section describes the results obtained from the two surveys in detail. The structure of the discussion follows the order of the questionnaire. At the end of each section the key findings are summarised in a few sentences.

3.2.3.1 General questions about the company

The sizes of the sub-samples turned out to be almost symmetric which offers the advantage of facilitating the comparison of the results. The total number of responses (166) is fairly evenly split into a German (82) and Australian (84) sub-sample. 64.6% of the German respondents are manufacturers as compared to 75.0% for the Australian responses. Overall, the sample thus consists of 69.9% manufacturers and 30.1% traders.

The job positions of the respondents — which reflects their professional competence and thus the quality of the survey results — can be categorised as follows. Overall, 48% of the respondents are managing directors or CEOs, 38% are export, marketing or sales managers. 6% company proprietors filled in the questionnaires and the remaining 7% of respondents hold other positions such as finance officers, accountants, assistants, etc. There are some differences between the German and the Australian sub-sample, as in the former the majority (47%) of the respondents hold more functional positions such as export managers, whereas in the latter more than half (58%) of all respondents hold a more general management position such as managing director or CEO. The same is true for the manufacturer and trader sub-samples: whereas the majority (51%) of the respondents of food manufacturing companies hold functional positions, 73% of those of the trading companies were managing directors or CEOs. This finding applies broadly also to the individual German or Australian manufacturer or trader sub-samples. In general, it becomes clear that the quality of the responses can be considered high, but the German responses may reflect a more technical/operational attitude, whereas the Australian responses may express a more general management point of view.

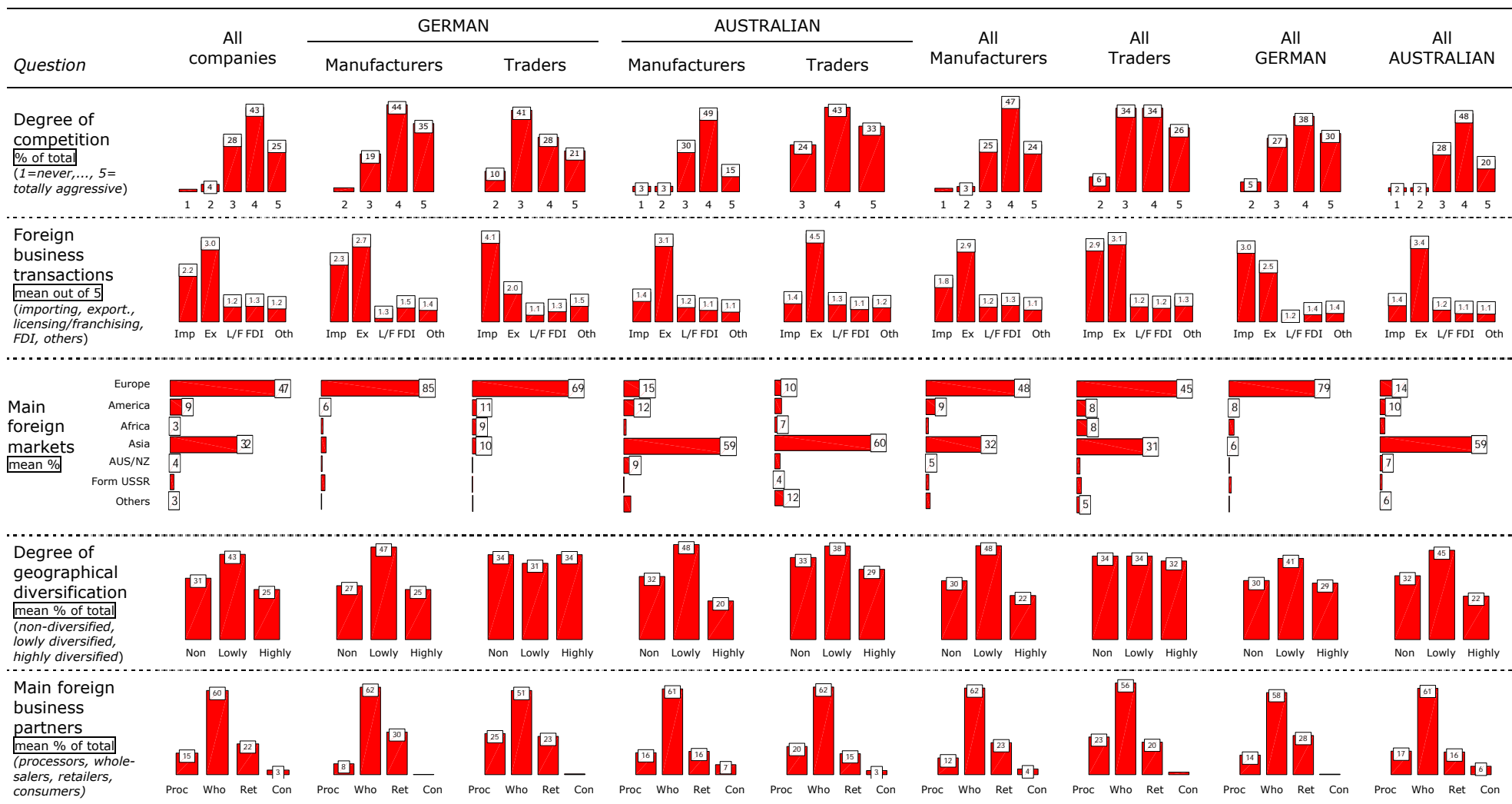
The sizes of the surveyed companies, as measured by the number of staff they employ, are in the majority of the cases rather small. Overall, 36% of the companies employ less than 10 people, and 24% between 10 and 49. Only 11% of them have staff in excess of 500 people. There are statistically significant differences (99% confidence level) in the means of the staff number between the German (411.0) and Australian (92.6), and the manufacturer (355.2) and trader (10.5) sub-samples. As a result, it becomes clear that German companies are generally larger than Australian ones and that in both countries manufacturers employ more staff than traders do.

The turnover (without taxes) classes of the surveyed companies can be described as follows: overall, 47% of the companies earned between DM10m and DM99m in the last financial year before the survey. 32% of all companies earned less than DM10m in that year, and only 5% DM500m or more. It is clear that companies that employ more staff should also have higher turnovers. However, it is interesting to calculate the turnover-per-employee ratio, since it may reflect overall productivity of the surveyed companies. Table 48 lists these ratios for all sub-samples. Even if these values

Table 47: Survey results — general questions about the company

Question	All companies	GERMAN				AUSTRALIAN				All Manufacturers	All Traders	All GERMAN	All AUSTRALIAN
		Manufacturers	Traders			Manufacturers	Traders						
No. of companies	166	53	29			63	21			116	50	82	84
Position of responders % of total (proprietor; managing dir. / CEO; export manager, etc.; others)													
No. of employees % of total													
Total turnover (without taxes) of last financial year % of total (DM million; DM1 = A\$0.83)													
Legal status of companies % of total (publicly listed, privately owned, others)			100% privately owned										
% of proprietors engaged in management	79.8	64.2	82.1			85.2	100			75.4	89.8	70.4	89.0
Corporate age in years mean (min/max)	41.0 (1/310)	77.3 (3/310)	30.0 (1/118)			26.8 (1/148)	8.3 (1/22)			49.6 (1/310)	21.1 (1/118)	60.2 (1/310)	22.3 (1/148)

continued



Source: Author's compilation from questionnaire responses.

seem high (which may be caused of biased responses), it becomes clear that German companies seem to have higher productivity levels than Australian ones. However, the differences are (at the 99% confidence level) only statistically significant for the sample as a whole and for the manufacturer sub-sample. For the trader sub-sample, the existing difference is not large enough to achieve generaliseability, given the small sample size of just 50 observations. In summary, the survey results suggest that German companies generally are not only larger, they are also more productive, as measured by turnover per employee.

Table 48: Mean turnover (without taxes, in DM'000) * per employee

	<i>Manufacturers†</i>	<i>Traders</i>	<i>Total†</i>
German	614.7	4 226.7	1 915.0
Australian	466.5	3 029.0	1 063.2
Total	534.9	3 763.9	1 494.9

Notes: * Australian turnover values have been converted using as exchange rate: DM1 = A\$0.83 (annual average rate of 1998).

† Differences between countries statistically significant (99% confidence level), using the exact Mann-Whitney U test for 2-independent samples.

Source: Author's compilation from questionnaire responses.

The legal status of the surveyed companies does not differ greatly between the sub-samples. In the great majority, companies are owned privately. Only 10% of German manufacturers are listed publicly, in all other samples, this figure is even lower. This finding corresponds well with the fact that most sample companies are small- and medium-sized businesses, which in general are listed rarely on stock markets.

The percentage of proprietors engaged in management turns out to be high in the surveyed companies. Overall, almost 80% of the owners hold either the position of a managing director or of a CEO. There is a statistically significant difference (99% confidence level) between the Australian (89.0% of proprietors engage in management) and the German (70.4%) sub-sample, but not between the manufacturer (75.4%) and trader (89.8%) sub-samples. This finding supports the results from the question on the job titles of the respondents in that the answers of the Australian companies may be biased versus general management, whereas German responses may reflect a more functional management background.

The corporate age of the surveyed companies varies widely. The mean age is 39.3 years, the maximum is 180 years and the minimum 1 year. As probably could have been expected, Australian companies have been existing for much less time (22.3 years), as compared to the German ones (56.7 years). Also, manufacturing companies are on average older (47.1 years) than trading businesses (21.1 years) (both findings are statistically significant at the 99% confidence level).

The degree of competition that the surveyed companies face does not differ greatly between countries, nor between business classes (no statistically significant differences at the 99% confidence level). Overall, 43% of survey respondents see their company operating in an 'aggressive' competitive environment, 28% in a 'middle aggressive', 25% in a 'totally aggressive', 4% in a 'less aggressive' and only 1% in a 'never aggressive' business environment.

The pattern of foreign business transactions, in the categories: *importing*, *exporting*, *licensing/franchising*, *foreign direct investment* (FDI), and *others* (such as consulting) is considerably different through the sub-samples. Overall, exporting is the category of foreign business transactions which is mostly practised (with a mean rating of 3.0 out of 5), followed by importing (2.2) and FDI (1.3). However, German companies import more (3.0) than they export (2.5), which is strongly opposed to the Australian pattern with exports leading (3.4) far ahead of imports (1.4). This structural dissimilarity is most apparent for the business class of the traders, which are strongly import-oriented in Germany (4.1) and strongly export-directed in Australia (4.5). For manufacturers the pattern of foreign business transactions is more uniform, with exports leading in both countries (2.7 for German companies versus 3.1 for Australian ones), ahead of imports (2.3 versus 1.4). In summing up, it becomes clear that in particular the German responses (and above all those from trading companies) reflect more an importer attitude, whereas the Australian ones are thoroughly export-oriented. All other categories of foreign business transactions don't seem to be very important in the surveyed companies.

The main foreign markets which are served differ widely between the surveyed companies from Australia and Germany, but not between manufacturers and traders. The very clear finding is that German companies do foreign business mostly in Europe (79% of the total foreign market) and America (8%), whereas for 59% of Australian companies Asia is the largest market, followed by Europe (14%) and America (10%). In calculating a measure for geographical diversification, which classifies companies into the three categories (i) *non-diversified* (i.e. they operate only in one continent), (ii) *lowly diversified* (two continents), and (iii) *highly diversified* (more than two continents), it appears that German companies are slightly more diversified than Australian ones, however this finding is not statistically significant.

As main foreign business partners, overall, *wholesalers* come first (60% of total foreign transactions), followed by *retailers* (22%), *processors/manufacturers* (15%), and *consumers* (3%). There are some differences between German and Australian companies: German businesses do not tend to deal directly with consumers (1%) and seem to prefer contacts with retailers (28%), whereas Australian companies interact more with consumers (6%) and less with retailers (16%). This finding is in particular true for Australian manufacturers, which is the most consumer-oriented sub-sample. Finally, as it could be expected, traders deal more with processors/manufacturers and manufacturers interact more often with wholesalers (i.e. traders).

In summary, the survey findings suggest that, in general, German companies are larger, older, more productive, they are more often publicly listed, they tend to be importers (in particular traders), they operate mostly in European markets, and they are less consumer-oriented than Australian businesses. Moreover, German responses reflect attitudes from functional (i.e. export, sales, etc.) managers, which seems logical since larger companies normally have higher degrees of specialisation and thus offer more functional job positions. The responses of Australian companies, on the other hand, express a more general management background (i.e. managing directors, or CEOs). Australian companies have their main foreign markets in Asia. The main structural differences between manufacturers and traders are, that manufacturers generally seem to have higher corporate ages, they are larger in size, and they are more export-oriented than traders.

3.2.3.2 Foreign business performance

The assessment of foreign business performance, or 'success', is difficult, given the multidimensional nature of this concept (DALLI 1994, p.96). That is, there are many, different, variables that can be used to measure foreign business performance. For example, Table 49 lists numerous measures that have been used for assessing export performance. However, as seen before, companies which operate internationally use in general more than just one international marketing strategy, i.e. they export and import or invest directly at the same time. In such a case, assessing foreign business performance as a whole may therefore even be more complex.

Table 49: Various measures of export performance

<i>Performance dimension</i>	<i>Variables</i>
<i>Export involvement / intensity</i>	<ul style="list-style-type: none"> ▷ Percentage of sales a company obtains from exporting ▷ Company's export sales/domestic sales compared with industrial average ▷ Annual export volume (categorised by cut-offs) ▷ Export stages ▷ Export sales compared with domestic sales on a "-3 to +3" bipolar scale ▷ Proportion of products exported ▷ Management's perception of export involvement
<i>Profitability, productivity and growth</i>	<ul style="list-style-type: none"> ▷ Perceptions about profitability of exporting relative to home marketing ▷ Export profitability/growth: total net income/sales growth compared to domestic income/sales growth ▷ Satisfaction with export performance ▷ Export productivity: export sales per employee or per manager ▷ International commitment: formalisation of internal arrangements for exporting activity; number of different channels used by the company; number of actual foreign customers; number of actual foreign markets
<i>Others (categorical measures)</i>	<ul style="list-style-type: none"> ▷ Exporting vs. non-exporting ▷ Export initiation: active vs. reactive; aggressive vs. passive; innate vs. adoptive; systematic vs. non-systematic ▷ Export intention: interested, plan, excess resource allocation ▷ Export experience ▷ Export markets OECD vs. developing countries ▷ Export market extension vs. concentration vs. diversification

Source: Adapted from BODUR M. (1994), 'Foreign market indicators, structural resources and marketing strategies as determinants of export performance', in CAVUSGIL S.T. & AXINN C.N. (eds.), *Advances in International Marketing — Export Marketing: International Perspectives*, Vol. 6, pp.186-7.

The variables used to evaluate international business success in this study were selected carefully in order to capture the various dimensions of the international business performance concept. However, only export and import activities were taken into consideration from the very start, as these activities were assumed to be the most important for small- and medium-sized food businesses. The following aspects were investigated: (i) the *length of foreign business experience* (in years), (ii) the *share of exports or imports in total turnover* (in %), the (iii) *growth rate of foreign business during the last three years* (in %), (iv) the *current business development tendency* (separate ratings on a 5-point scale for foreign, domestic and total business activities), and (v) the *future (next three years) business development tendency* (measured on the same 5-point scale). Finally, another variable was introduced in order to control for different growth tendencies in different countries or for different products. In order not to run the risk of wasting valuable questionnaire space for questions with a small likelihood of being answered, no question

asked about foreign business profitability. This is, because in general companies are reluctant to give somehow confidential information. Already the question for the growth rate was critical, and indeed it turned out to be the question with the lowest overall response rate, which caused 12% of the questionnaires to be excluded from the final evaluation seeking to identify the key success factors. In the following, the responses to these questions will be presented. How these variables were used to differentiate successful companies from less successful ones is described in Section 3.2.3.10.

The length of foreign business experience differs statistically significantly (99% confidence level) between German (mean 28.1 years) and Australian (10.4 years) companies. However, there is no significant difference between manufacturers (19.4 years) and traders (18.5 years), although there is one in corporate age (see above). This implies that traders from the very beginning of their business activity either already start as export/import business or very soon begin to operate internationally. This conclusion is supported by the calculation of the ratio of *years of foreign business experience/corporate age*, which gives an index measure ranging from 1 (business is from the very start involved in international deals) to 0 (business has not yet started to operate internationally). Table 50 lists these ratios. It becomes clear that there is a general statistically significant difference between manufacturers and traders with the latter going much earlier into foreign markets. Moreover, between countries there is a statistically significant difference for manufacturers, i.e. German companies start foreign business activities considerably later than Australian ones.

Table 50: Mean ratios* indicating the speed of foreign market entering for German and Australian business classes

	<i>Manufacturers†</i>	<i>Traders</i>	<i>Total</i>
German‡	.44	.96	.62
Australian‡	.59	.95	.68
Total‡	.52	.96	.65

Notes: * Ratio calculated as *years of foreign business experience/corporate age*, which gives an index measure moving between 1 (business is from the very start involved in international deals) and 0 (business has not yet started to operate internationally).

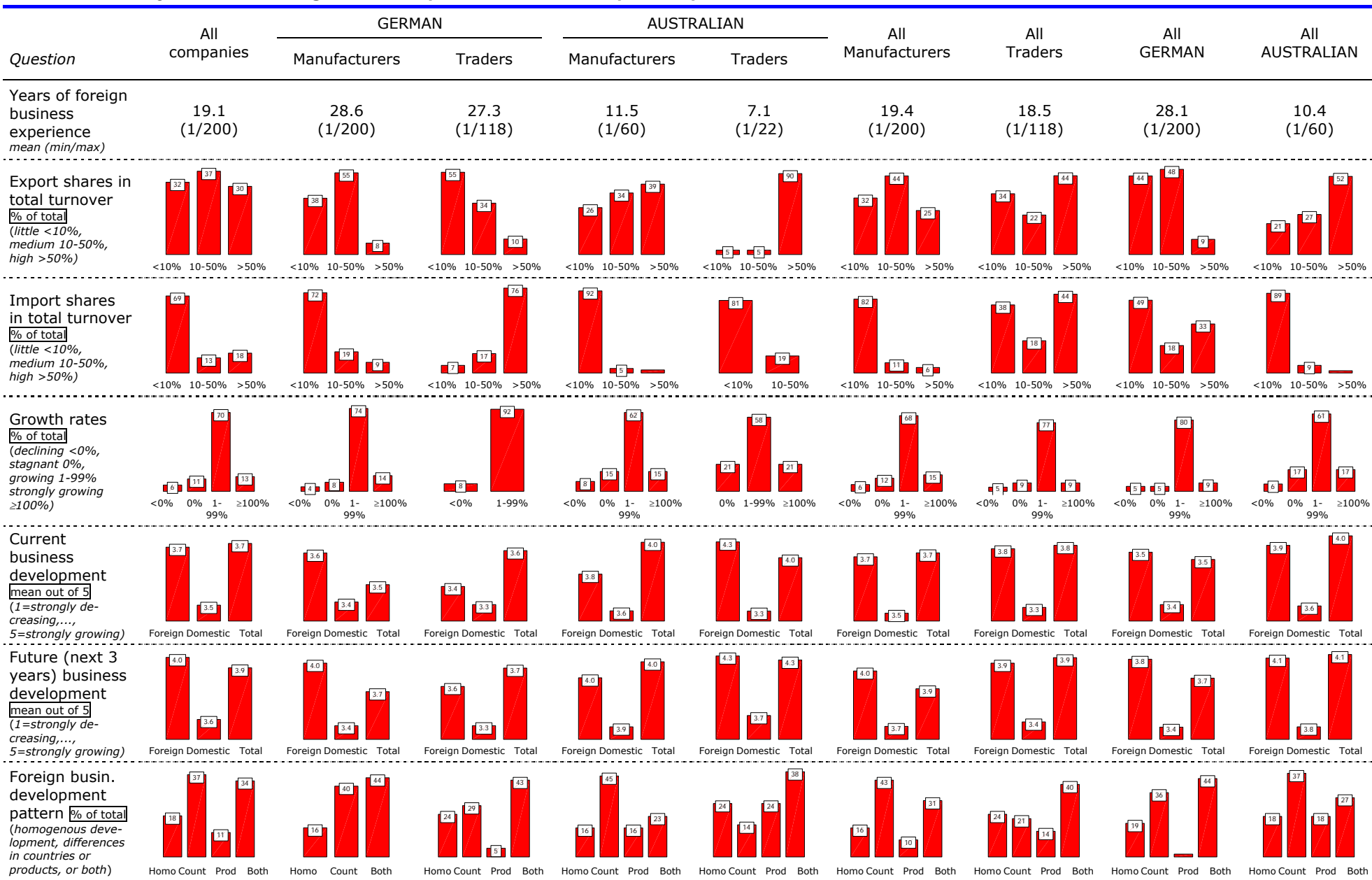
† Differences between countries statistically significant (95% confidence level), using the Monte Carlo Mann-Whitney U test for 2-independent-samples.

‡ Differences between business classes statistically significant (99% confidence level), using the exact Mann-Whitney U test for 2-independent-samples.

Source: Author's compilation from questionnaire responses.

The questions about export and imports shares (in total turnover) confirm generally what has already been found in the question about the foreign business transactions (see above). Australian companies are generally more export-oriented (52% of all respondents have export shares of more than 50%, as compared to only 9% of German businesses). On the other hand, 33% of German companies have import shares in excess of 50%, but only 2% of Australian respondents are in this category. The main difference is between the trading companies, as they are strong exporters in Australia (90% have export shares larger than 50%), but strong importers in Germany (76% have import shares larger than 50%). Both measures will be used later to calculate a combined 'trade share' in order to measure the strength of foreign business involvement.

Table 51: Survey results — foreign business performance of sample companies



Source: Author's compilation from questionnaire responses.

The growth rates of total foreign business (as measured by the percentage change in *foreign business turnover / total turnover* during the last three years) show a fairly homogenous distribution through all sub-samples. Overall, 70% of the respondent companies have had mean growth rates between 1% and 99%, 13% of the companies in excess of 100%, 11% of the companies have not shown any growth, and 6% have had negative growth. There are no statistically significant differences between the mean growth rates of the sub-samples, suggesting that the industry structure is quite mature in both countries. The growth rates will be used later to classify sample companies into more and less successful companies.

The current and the future business development tendencies are highly correlated. This finding indicates that managers may interpolate from the current situation into the medium-term future. However, the results show also that the assessment given in questionnaires is not always reliable. Theoretically, the total business development tendency should always be a weighted mean of the foreign and the domestic development tendency. However, Australian companies in particular (and above all Australian manufacturers) have rated the total business tendencies more positively than its two components. This is also true for German traders. In general, however, all companies assess the foreign business development tendencies more positively than the domestic ones. Australian companies rate the current foreign business development tendency significantly higher (99% confidence level) than German companies (3.9 versus 3.5, on a 5-point rating scale), but there is no statistically significant difference between manufacturers (3.7) and traders (3.8). This pattern is also true for the future (next three years) foreign business development tendency (at the 95% confidence level). Thus, to sum up, Australian companies in general seem to be more optimistic about the future of their foreign business activities.

The future foreign business pattern, i.e. whether the sample companies expect homogenous growth, or rather differences in countries or products, is assumed to change by most respondents. Overall, only 18% of the respondents expect homogenous growth, 37% see changes in the composition of foreign countries they operate in, 11 % see changes in the products they exchange currently with foreign countries, and 34% of the companies see changes in both countries and products. Australian companies expect a stronger change in the products they exchange (18%) than German ones (1%). 43 % of the manufacturers expect changes in the foreign countries they deal with, versus only 21 % of the traders. Although these findings are interesting, this variable will not be used further for a classification of more or less successful companies.

In summary, it becomes clear that measuring foreign business performance or 'success' is complex, since this concept is multidimensional in nature. Nevertheless, the survey results suggest that trading companies start significantly faster with foreign business activities than manufacturing companies, but that German manufacturers are even significantly slower than Australian ones. German companies (and in particular German trading companies) are more import-oriented, whereas Australian food product businesses are more export-oriented. There is no statistically significant difference in the past growth rates between German and Australian companies, but the latter rate their current and medium-term future business development tendencies significantly more positively. These findings will be used in Section 3.2.3.10 for a classification of the sample companies into groups which operate of more or less internationally successfully.

3.2.3.3 Foreign business qualification

This section investigates a number of independent variables with respect to the foreign business qualification of a company, and which may influence its foreign business performance. In particular, the *relative number of staff employed directly for foreign business activities*, the *education and job training of these employees*, their *foreign language skills*, and their *knowledge of foreign business partners' mentality* are addressed. The respondents were also asked how they would assess the critical importance of some of these variables.

The number of staff engaged directly in foreign business activities differs considerably between the companies. It can be expected that the number of foreign business staff rises proportionally with the size of a companies and the share of its foreign business in total business activities. However, in calculating a ratio between these variables, it should be possible to compare the relative use of staff for foreign business activities net of the effects of overall company size and foreign business involvement. Table 52 lists these ratios and it becomes clear that there is a statistically significant difference (99% confidence level) between German and Australian companies, indicating that the latter employ structurally more staff for the same degree of foreign business involvement. On the other hand, there is also a statistically significant difference between manufacturing and trading companies, with the former employing slightly more staff. These figures confirm the findings concerning the 'mean turnover per employee' and may simply reflect the fact that larger companies (and in the sample German companies are larger than Australian ones) have in general higher productivity levels than smaller ones.

Table 52: Mean ratios* indicating the relative number of staff employed for the same degrees of foreign business activities in German and Australian business classes

	<i>Manufacturers†</i>	<i>Traders†</i>	<i>Total†</i>
German‡	1.20	1.28	1.23
Australian‡	1.79	1.74	1.78
Total‡	1.51	1.48	1.50

Notes: * Ratio calculated as $(\text{no. of staff employed directly for foreign business activities} / \text{total staff of firm}) / [0.5 * (\text{export share} + \text{import share})]$, which gives an index measure indicating the relative use of staff per the same degree of foreign business involvement. The higher this value, the higher the companies are staffed relatively.

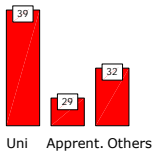
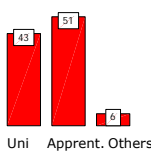
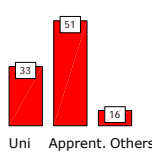
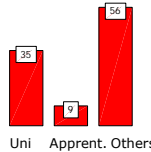
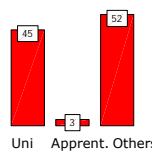
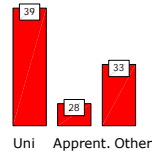
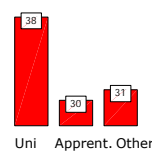
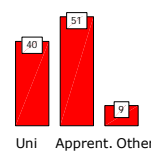
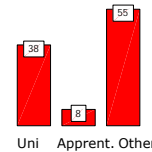
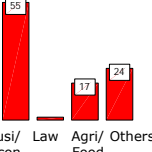
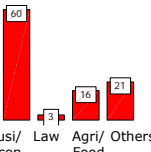
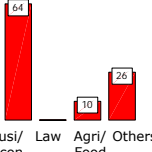
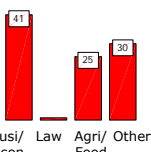
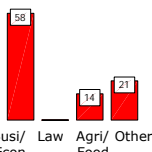
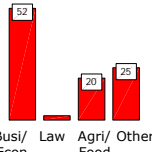
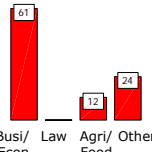
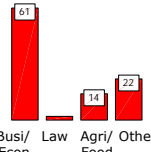
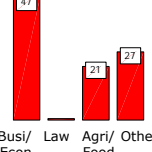
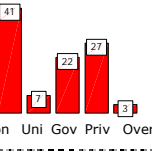
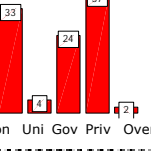
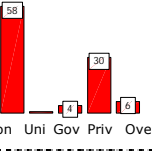
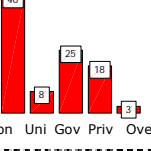
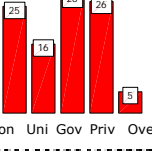
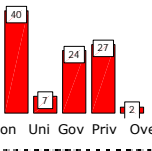
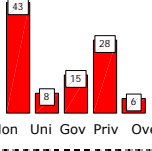
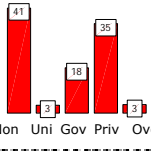
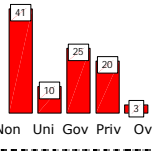
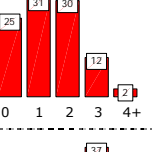
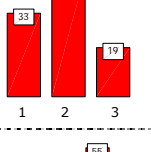
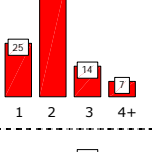
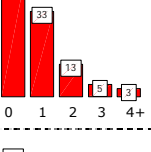
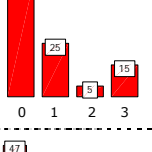
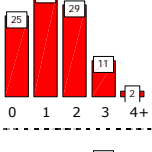
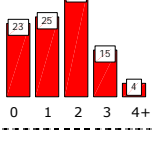
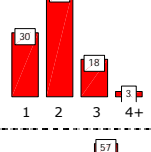
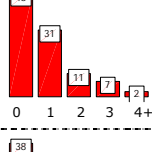
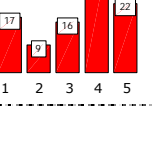
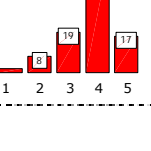
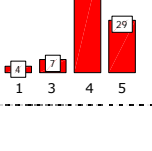
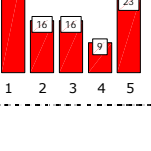
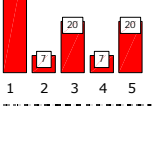
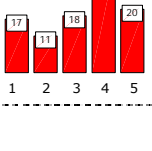
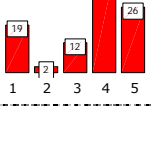
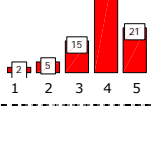
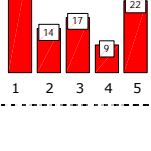
† Differences between countries statistically significant (99% confidence level), using the exact Mann-Whitney U test for 2-independent-samples.

‡ Differences between business classes statistically significant (99% confidence level), using the exact Mann-Whitney U test for 2-independent samples.

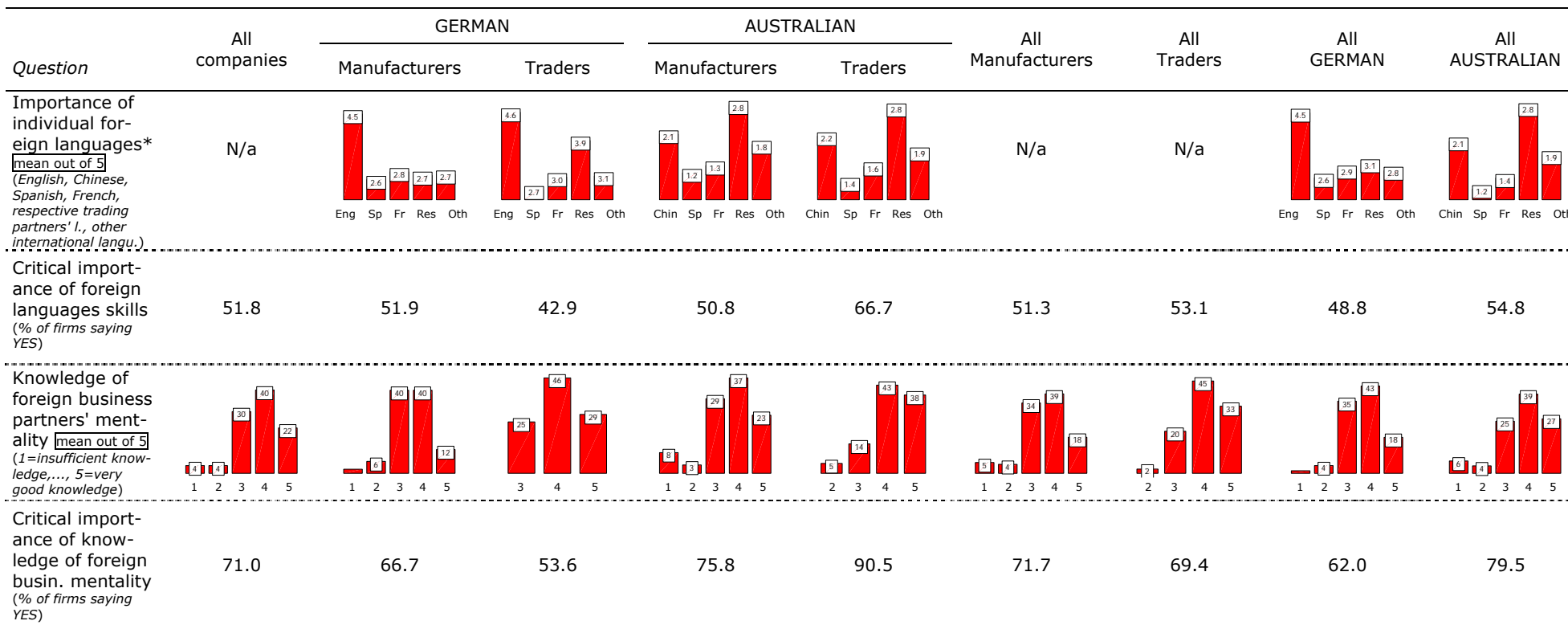
Source: Author's compilation from questionnaire responses.

The education and job training of the foreign business staff can be classified into three categories: *university degrees/diplomas*, *apprenticeships*, and *others* (such as e.g. non-academic degrees from private or public institutions, or no particular job training at all). In both countries, about 40% of the foreign business staff hold university degrees/diplomas. In Germany, the share of the apprenticeship kind of job training is quite important (51%), given the overall importance of this sort of job training in the country. In Australia, 'other' forms of job training (55%) are most important, indicating that the German and the Australian educational systems may not be directly comparable. There are no major differences between manufacturing and trading companies.

Table 53: Survey results — foreign business qualification of sample companies

Question	All companies	GERMAN			AUSTRALIAN			All Manufacturers	All Traders	All GERMAN	All AUSTRALIAN
		Manufacturers	Traders		Manufacturers	Traders					
# of employees for foreign business activities mean (min/max) mean share in total employees	22.4 (0/2000) 29.0%	60.1 (0/2000) 7.9%	4.2 (1/11) 49.0%		4.7 (0/40) 20.4%	3.4 (1/12) 82.5%		30.3 (0/2000) 14.6%	3.9 (1/12) 63.3%	40.8 (0/2000) 21.9%	4.4 (0/40) 35.9%
Education/training of foreign business staff mean % of total (university degree, apprenticeship, others)											
											
Kind of university courses mean % of total (business/economics, law, agriculture/food related studies, others)											
											
Further education/training mean % of total (none, postgraduate uni courses, courses of governmental or private institutions, overseas training)											
											
No. of foreign languages spoken mean % of total (0 to 4+)											
											
Degree of command of foreign languages spoken mean % of total (1=insufficient knowledge,..., 5=very good knowledge)											
											

continued



Note: * 1=non important, ..., 5=very important. N/a = non applicable, as questions for German and Australian companies were different.

Source: Author's compilation from questionnaire responses.

The kind of university courses that the foreign business staff attended show a consistent pattern through the sub-samples. Overall, 55% of the staff attended *business* or *economics* courses, 17% *agriculture* or *food related studies*, 1% *law*, and 24% of the staff attended *other courses*. The main difference between German and Australian companies is that for the latter the share of agriculture/food related studies is higher (21%) at the expense of business/economics courses (47%), as compared to German companies (14% vs. 61%). The same is basically true for food manufacturing companies, where 20% of their staff hold agriculture/food related degrees, as compared to only 12% in trading companies. German traders employ staff with the highest degrees of business/economics degrees (64%), whereas Australian manufacturers are the most important employers of staff with agriculture/food related degrees (25%).

Further job training and education of staff which works directly in foreign business activities can be provided by different institutions. Apart from *universities*, there are *government* or *private institutions*, such as customs agencies, foreign consulates, language schools, or experienced private trainers which offer courses of specialised further job training. Another possibility are *specialised courses obtained in a foreign country*. However, overall, 41% of all samples companies have never used any kind of further job training for their staff. 27% have used courses offered by private institutions, 22% courses offered by government agencies, 7% programs from universities, and 3% have used offerings in foreign countries. In Australia, government programs are mostly favoured (25%), ahead of private courses (20%), and universities (10%). German companies prefer job training from private institutions (35%), followed by those from government agencies (18%), and universities (3%). Manufacturers seem to use slightly more further job training programs than trading companies (only 40% have never used any offering versus 43% of the traders). Moreover, manufacturers use job training from governments (24%) more often than trading companies (15%). The most reluctant sub-sample to use any kind of further training are German traders (58% have never used any program), followed by Australian manufacturers (46%).

The number and the degree of command of foreign languages spoken differs significantly between the German and the Australian sub-samples. On average, employees dealing with foreign customers/suppliers in German companies speak 1.9 foreign languages, as compared to 0.8 for the employees in Australian companies (the difference is statistically significant at the 99% confidence level). 48% of the staff of Australian companies speak no foreign language at all, whereas 50% of the employees in German companies speak two foreign languages. On average, employees dealing with foreign customers/suppliers in trading companies speak 1.5 foreign languages (2.0 in German companies vs. 0.8 in Australian ones), as compared to 1.3 to those employed in manufacturing companies (1.9 vs. 0.9). The difference is, however, not statistically significant. German employees do not only speak more foreign languages, they also seem to have higher degrees of command of the foreign languages they speak, as compared to the Australian staff. On average the skill level of employees of German companies are rated 3.9 on a 5-point rating scale versus 2.6 for Australian staff (the difference is statistically significant at the 99% confidence level). Employees dealing with foreign customers/suppliers in trading companies have a command level of 3.5 versus 3.3 of those working in manufacturing companies. However, this difference is, as for the number of foreign languages spoken, not statistically significant. In all, it becomes clear that German companies are better qualified with respect to foreign languages than Australian ones.

The importance of individual foreign languages can be expected to be different for German and Australian companies. For German companies, English is by far the most important foreign language (a rating of 4.5 on a 5-point scale), followed by the respective language of the foreign trading partner country (3.1), French (2.9), other international languages (2.8), and Spanish (2.6). For Australian companies, the respective languages of the trading partner countries are most important (2.8), followed by Chinese (2.1), other international languages (1.9), French (1.4), and Spanish (1.2). There are no major differences between manufacturing and trading companies in the two countries.

The critical importance of foreign languages skills is assessed differently by German and Australian businesses. The majority of Australian companies (55%) think that better foreign language skills of their employees dealing with foreign customers/supplies would significantly improve their foreign business success. On the other hand, only 49% of German companies confirm this view. (The difference between Australian and German companies is, however, not statistically significant, using the exact chi-square test in a 2x2 cross-tabulation) Between manufacturers (51%) and traders (53%) there seems to be no major difference, but there is a great dissimilarity between Australian traders (67% of agreement) and German ones (43%). These findings suggest that the more foreign languages are mastered and the better their command levels, the less important these skills are seen by their users.

The knowledge of foreign business partner's mentality is overall assessed as being good. Measured as a rating on a 5-point scale, 40% of the respondents think that their employees who deal with foreign customers/suppliers have good knowledge, 30% judge it as average, 22% give the highest ranking of 5 (very good knowledge), 4% of the respondents see it as sufficiently, and only the remaining 4% think that this knowledge is insufficiently. There is no statistically significant difference between the German (mean rating: 3.7) and the Australian (3.8) sub-sample, however, there is one between manufacturers (3.6) and trading companies (4.1) (99% confidence level). For the different business classes between the two countries, the results are relatively homogenous.

The critical importance of the knowledge of foreign business partners' mentality is acknowledged by the majority of all companies (71%). There is, however, a statistically significant difference between the German (62%) and the Australian (80%) sub-sample (95% confidence level, using the exact chi-square test in a 2x2 cross-tabulation). The difference between manufacturers (72%) and traders (69%) is not statistically significant. Australian traders rate this knowledge as particularly important (91%), whereas only 54% of German traders agree. The large difference between the Australian and the German opinions may be caused by the fact that Australians do most of their foreign business in Asian markets where the mentality difference as compared to the "western" way of thinking and acting may be quite distinctive. For German businesses, which operate mostly in relatively similar European neighbouring country cultures, this aspect is then understandably less a problem.

In summary, the survey results suggest that German companies have relatively fewer staff dealing with foreign business activities. In both countries about 40% of the employees hold a university degree, which is most likely a business/economics one. Furthermore, about 40% of the companies have never used any sort of further specialised job training for their employees, but if they do, German companies generally tend to choose private institutions, whereas Australian companies rely more on government

programs. Employees who deal with foreign customers/suppliers in Germany know significantly more foreign languages and master these significantly better than employees in Australian companies. On the other hand, Australian companies rank the importance of foreign language skills higher than German ones, despite the fact that English may be the most important business language in the world. The importance of the knowledge of foreign business partners' mentality is assessed by Australian companies as significantly higher than by German companies, although there does not seem to be a great difference in the knowledge level between the two countries. This may be caused by the fact that Australian companies do most of their foreign business in Asian countries, i.e. in a, in general, culturally different environment. Overall it becomes clear that there are structural differences between the Australian and the German sub-sample, in particular with respect to the number of staff employed for foreign business activities and the foreign language skills. Between the two business classes, there are no major structural differences, apart from the fact that traders seem to rank the knowledge their employees have about the mentality of their foreign business partners significantly higher than manufacturers do. However, this finding may be due to the fact that sample trading companies are more involved in foreign business than manufacturers and therefore they have more contact with foreign customers or suppliers.

3.2.3.4 Trade fair activities

The percentage of companies which participate in trade fairs at all (as visitors or exhibitors) is on average about 78% for all companies together, with 89% being the average for German companies and 67% for Australian companies. The figures for manufacturers are 78% and for traders 76%. The sub-sample with the lowest percentage of companies taking part in trade fairs is the Australian trader one (68%), the one with the highest value are German manufacturers (91%). However, these figures do not take into consideration how often companies take part in trade fairs during a year.

The trade fair participation level of companies can be measured more accurately by calculating the (unweighted) mean of their annual number of participations as visitor or exhibitors in home country or foreign country trade fairs. Table 54 lists index values based on this measuring concept for German and Australian manufacturing and trading companies. It becomes clear that German companies statistically significantly have higher participation rates (99% confidence level) than Australian companies, which is in particular true for food product manufacturers. In Germany there is also a statistically significant difference in trade fair participation between manufacturing and trading companies, with the former being the sub-sample with the highest participation rate at all. The main difference between German and Australian companies is that the former exhibit strongly in the home country, whereas the latter hardly exhibit in Australia. This finding may be due to the existence of the ANUGA trade fair held in Germany, one of the largest food trade fairs in the world, and the lack of a major internationally important Australian food trade fair. The general difference between manufacturers and traders is that the former mostly take part in trade fairs as exhibitors, whereas traders are mostly trade fair visitors. However, Australian traders also exhibit strongly at foreign fairs, despite the fact that they are the sub-sample with lowest participation rate of all.

Table 54: Mean index values* indicating the degree of trade fair participation of German and Australian food product manufacturers and traders

	<i>Manufacturers†</i>	<i>Traders</i>	<i>Total‡</i>
German‡	1.15	.86	1.05
Australian	.73	.64	.71
Total	.92	.77	.87

Notes: * Index value calculated as the mean of the variables: *visitor in home country trade fairs*, *exhibitor in home country trade fairs*, *visitor in foreign country trade fairs*, *exhibitor in foreign country trade fairs*, where each variable can take integer values between [0, 3], with 0 = no participation, 1 = less than 3 times a year, 2 = 3 to 6 times a year, and 3 = more than 6 times a year. The index measure can take values between 0 (no trade fair participation at all) and 3 (very intensive trade fair participation).

† Differences between countries statistically significant (99% confidence level), using the exact Mann-Whitney U test for 2-independent-samples.

‡ Differences between business classes statistically significant (99% confidence level), using the exact Mann-Whitney U test for 2-independent samples.

Source: Author's compilation from questionnaire responses.

The main purposes of trade fairs for visitors are the *making, keeping or improving of contacts* (with an overall mean rating of 4.2 on a 5-point scale), *market analysis/observation of competitors* (3.8), *obtaining general information* (3.8), *acquisition of deals* (3.1), and *other purposes* (2.3). There are no major differences between the German and the Australian sub-sample, nor between the manufacturer and trader one. The biggest difference can be found between German and Australian traders, with the former rating the 'obtaining of general information' aspect considerably higher than the later (4.2 versus 3.5).

The main purposes of trade fairs for exhibitors are similar to the ones for visitors. However, for exhibitors, the *making, keeping or improving of contacts* aspect is even more important (with an overall mean rating of 4.6 on a 5-point scale), as it is the *acquisition of deals* purpose (3.9). Also very important is the *presentation of the company or its products* (4.4). The importance of *market analysis/observation of competitors* (3.7), and *other purposes* (2.3) are almost equally important as for visitors. As seen before, there are no major differences between the German and the Australian sub-sample, nor between the manufacturer and trader one.

Trade fair expenses and staff use of the sample firms could be analysed quite exactly from the obtained data (see Table 55). The *average annual trade fair expenses* vary widely between the sub-samples, as they depend on the company size and the number of a company's trade fair participations per year. The overall mean value is about DM81 000, varying between DM30 000 for Australian firms and DM121 000 for German firms, and between DM98 000 for manufacturers and DM42 000 for traders. More interesting is the *percentage of trade fair expenses in total turnover* of a company. Here the figures display no statistically significant variation between the sub-samples. The overall value is about 0.7%, which is the same for German and Australian firms. Manufacturers spend on average 0.8% (0.9% in Germany vs. 0.7% in Australia) of total turnover for trade fair activities as compared to 0.4% (0.3% vs. 0.6%) for traders. The *annual number of staff deployed on trade fairs* is on average 10 for all sample firms, with the same strong variation between the sub-samples as for the total annual trade fair expenses. However, relating this figure to the total staff employed yields more meaningful information. Overall, the *annual number of staff deployed on trade fairs as a percentage of total staff employed* equals about 49%, with the figures for the individual sub-samples: 54% (German firms), 43% (Australian firms), 34% (manufacturers), 87% (traders).

Table 55: Survey results — trade fair activities of sample companies

Question	All companies	GERMAN				AUSTRALIAN				All Manufacturers	All Traders	All GERMAN	All AUSTRALIAN
		Manufacturers		Traders		Manufacturers		Traders					
Trade fair participation index values (as visitors or exhibitors in home and foreign countries)													
Main purposes of trade fairs as a visitor (mean out of 5 (*))													
Main purposes of trade fairs as an exhibitor (mean out of 5 (**))													
Trade fair expenses and staff use of firms (mean values; DM1 = A\$0.83)	% of sample firms engaging in fairs	77.7%	90.6%	86.2%	68.3%	61.9%	78.4%	76.0%	89.0%	66.7%			
	Average annual expenses	DM81 300	DM158 200	DM49 000	DM30 100	DM28 400	DM97 700	DM42 000	DM120 800	DM29 700			
	% of expenses in total turnover	0.68%	0.88%	0.27%	0.72%	0.60%	0.80%	0.38%	0.66%	0.69%			
	Average annual # of staff deployed	10.0	19.1	6.5	4.2	2.5	12.0	5.0	14.9	3.8			
	% of trade fair staff in total staff	49.1%	43.9%	73.7%	23.4%	110.6%	34.3%	86.4%	53.7%	43.1%			
	Expenses per staff deployed	DM11 500	DM13 350	DM10 100	DM9 900	DM13 300	DM11 700	DM11 300	DM12 300	DM10 700			
	% of companies receiving financial support	18.1%	26.4%	0%	22.2%	9.5%	24.1%	4.0%	17.1%	19.0%			
Average amount of financial support	DM2 950	DM4 960	DM0	DM2 300	DM3 200	DM3 700	DM1 100	DM3 300	DM2 500				
% of companies preferring an individual trade fair stand (mean)	67.9	83.3	80.0	45.5	64.3	65.2	74.4	82.2	50.0				
Critical importance of trade fair efforts (% of firms saying YES)	48.4	44.2	38.5	56.7	47.6	50.9	42.6	42.3	54.3				

Notes: * (obtaining general information; market analysis/observation of competitors; making, keeping or improving contracts; acquisition of deals; others)

** (presentation of firm or products; market analysis/observation of competitors; making, keeping or improving contracts; acquisition of deals; others)

Source: Author's compilation from questionnaire responses.

The difference is statistically significantly different (99% confidence level) between the two business classes, but not between the two countries. Another measure is the *average trade fair expenses per staff deployed*, which can be simply calculated as ratio between the two variables just discussed. This ratio yields interesting and reliable figures which are quite stable between the sub-samples (i.e. with no statistically significant differences between them). Overall, companies spent about DM11 500 (= A\$9 500) per employee at trade fairs in 1998/99, DM12 300 by German companies, DM10 700 by Australian companies, DM11 700 by manufacturers, and DM11 300 by traders. Australian traders and German manufacturers spent about DM13 000, whereas Australian manufacturers and German traders spent about DM 10 000. *Financial government grants* for trade fairs receive about 18% of all companies (17% in Germany, 19% in Australia; 24% of manufacturers and 4% of traders). German sample trading companies receive no financial support at all. The overall average amount of financial support is about DM3 000 (= A\$2 500), with DM3 300 for German companies and DM2 500 for Australian companies (the difference is not statistically significant). However, manufacturers receive significantly (99% confidence level) more than traders do (DM3 700 versus DM1 100). In summing up, it becomes clear that there is no structural difference concerning trade fair investments between German and Australian companies. However, there is one between manufacturers and traders, with the former spending — in relative terms — significantly more, employing significantly less staff, and receiving significantly more financial grants from governments.

The percentage of companies preferring an individual trade fair stand differs statistically significantly between the two countries (99% confidence level, using the exact chi-square test in a 2x2 cross-tabulation), but not between the two business classes (82% of German companies versus 50% of Australian ones, and 65% of manufacturers vs. 75% of traders). However, no statistically significant relationship has been found (using cross-tabulation and chi-square testing) between the company size or the degree of trade fair involvement, and the preference for an individual stand — as opposed to a shared, community stand. Thus, there are perhaps cultural factors which explain the differences in the preferences between the German and Australian companies.

The critical importance of trade fair efforts is not rated in a statistically significantly different way between the sub-samples. 54% of Australian companies think that additional trade fair efforts (i.e. higher levels of participation or bigger presentations at trade fairs) would significantly improve their foreign business success, as opposed to 42% of German companies. For manufacturers and traders the corresponding figures are 51% and 43% respectively. German traders rate the importance of trade fairs lowest (39%), whereas Australian manufacturers seem to be most convinced of their importance (57%). Overall, not even half of the sample companies (48%) acknowledge the importance of trade fairs.

In summary, it becomes clear that the only significant difference between German and Australian companies are the higher participation rates at trade fairs. Moreover, German companies exhibit strongly in the home country, whereas Australian ones hardly exhibit in Australia. The most important purpose of trade fairs in both countries is the 'making, keeping or improving of contacts'. There is no major difference concerning trade fair expenses and staff use, however significantly fewer Australian companies prefer individual stands than German companies. The general difference between manufacturers and traders is that the former mostly take part in trade fairs as exhibitors, whereas traders are mostly visitors. Manufacturers spend more, employ less staff, and receive more financial grants from governments.

3.2.3.5 Food product-related questions (logistics and marketing problems)

This sub-section investigates problems which are related to the nature of food products. In particular, selected aspects of logistics are investigated, such as transport and storage. Moreover, marketing problems specific to the export of food products, and trade-related administration problems are addressed. Many of these issues have not yet been researched intensively for food product companies, which implies that information about these problem areas is hard to find in the relevant literature.

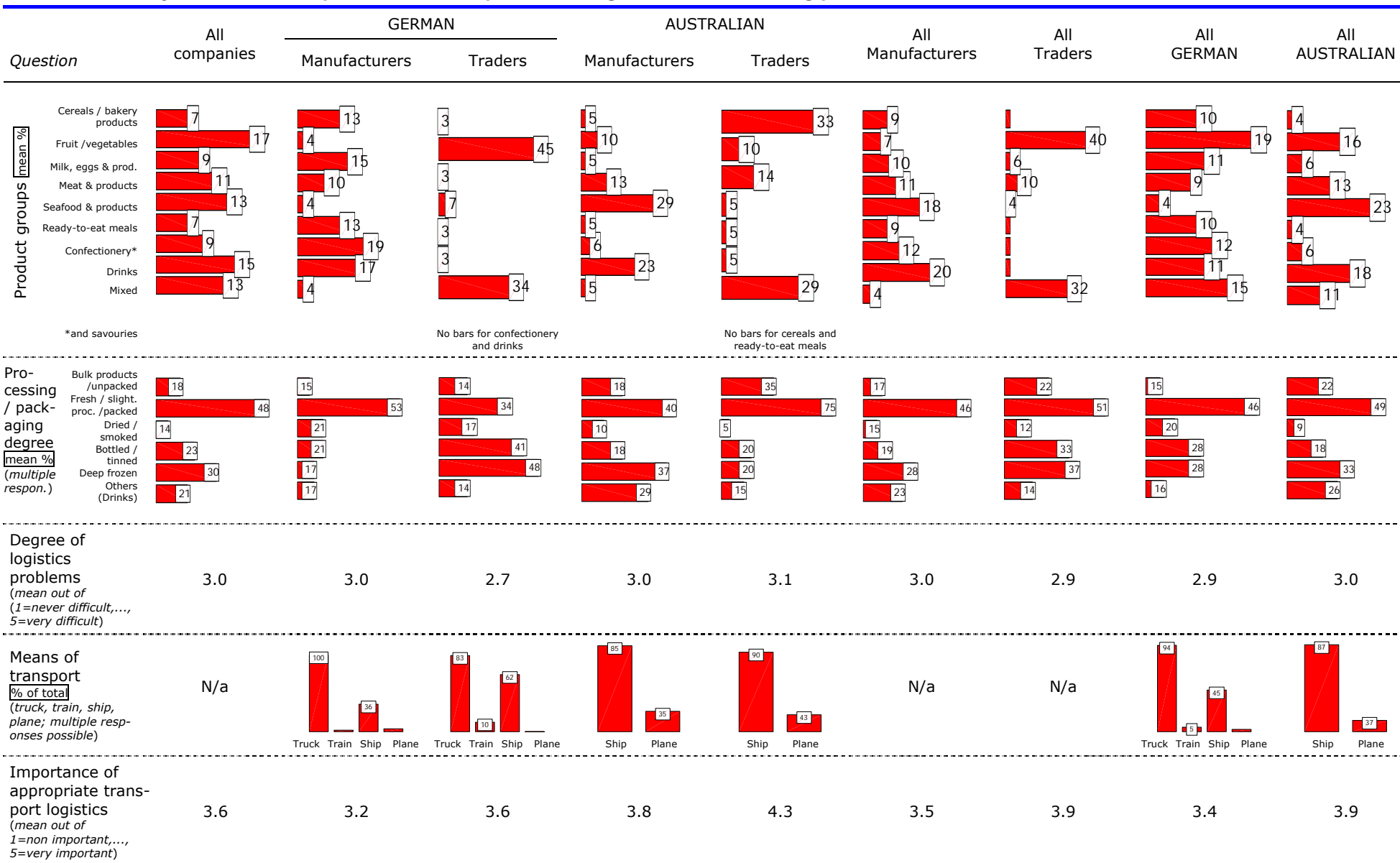
The main product/commodity groups the sample companies work in are: *fruit and vegetables* (17%), *drinks* (beer, wine, and soft) (15%), *seafood and products* (13%), *mixed* (13%), *meat and products* (11%), *confectionery* (9%), *milk and dairy products* (9%), *ready-to-eat meals* (7%), and *cereals/bakery products* (7%). The German sample companies are more concentrated in the product groups: fruit and vegetables (16%), mixed (15%) and confectionery (12%), whereas Australian companies are mostly in fish and seafood (23%), drinks (18%), and fruit and vegetables (16%). The sample trading companies operate mostly in the product categories fruit and vegetables (40%), mixed (32%), and meat and products (10%), whereas manufacturers are mostly in drinks (20%), seafood and products (18%), and meat and products (11%). There are no major differences between the German and Australian trader sub-samples, however Australian manufacturers are mostly in seafood and products (29%) and drinks (23%), whereas German manufacturers produce mostly confectionery (19%) and drinks (17%). Overall, it may be claimed that the survey samples reflect well the diverse structure of the German and Australian food manufacturing/processing sector.

The degree of processing and packaging applied to the products provides information on the degree of industrialisation of the sample companies. For traders, it reflects the degree of logistical complexity, since fresh produce or deep frozen products in general require specialised transport and storage facilities. Overall, 48% of the products the sample companies deal with are *fresh or slightly processed and packed*. 30% are *deep frozen*, 23% are *bottled/tinned*, 18% are *unpacked bulk products*, 14% are *smoked or dried*, and 21% of the products have undergone *other forms of processing and packaging*, such as those required for the production of drinks.¹¹⁰ Australian sample company responses indicate a higher use of deep frozen and bulk products, and of other forms of processing/packaging as compared to German companies. Traders handle more deep frozen, bottled/tinned, and bulk products than manufacturers. Australian traders are mostly in bulk products whereas German ones deal mostly with deep frozen ones. German manufacturers are mainly in the 'fresh or slightly processed and packed' category, whereas Australian ones also use strongly deep freezing and other forms of processing/packaging.

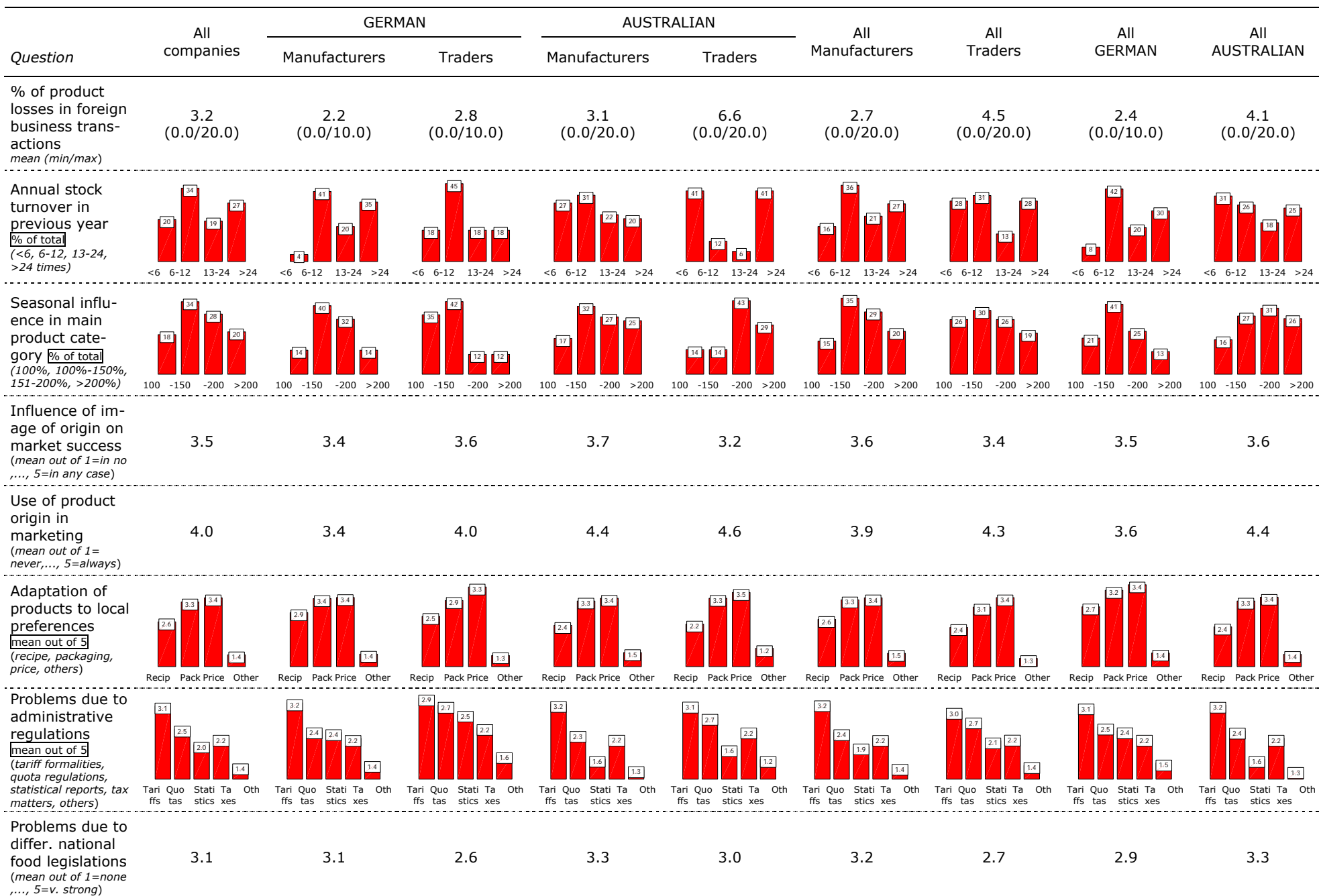
The degree of logistics problems that the sample companies face is on average ranked as 'middle difficult' (3.0 on a 5-point scale). There is no statistically significant difference between the individual sub-samples which display all values of around 3.0. Only German traders with a mean value of 2.7 rank the degree of logistics problems a little bit lower than the other sub-samples.

¹¹⁰ In this question, multiple responses were possible.

Table 56: Survey results — food product related questions (logistics and marketing problems)



continued



Source: Author's compilation from questionnaire responses.

The means of transport used by the sample companies differ, naturally, between the two countries. For German companies the use of *trucks* is most important (94% of the respondents use them regularly), followed by *ships* (45%), *trains* (5%), and *planes* (2%). Australian companies can send their merchandises to foreign countries only by ship (87%) or aircraft (37%).¹¹¹ Between Australian manufacturers and traders, there are no major differences, however German traders use ships and trains more intensively than German manufacturers, which rely mostly on trucks.

The perceived importance of the availability of appropriate transport logistics in the foreign business partner countries — which e.g. assures the necessary temperature, moisture levels, or air composition — is on total average ranked as 'important' (3.6 on a 5-point scale). There is a statistically significant difference between the Australian (3.9) and the German sub-sample (3.4), perhaps indicating that Asian markets, in which Australian companies do most of their foreign business, are not yet as advanced in this respect as European countries, in which most of the German companies operate. Between manufacturers (3.5) and traders (3.9) there is no statistically significant difference, nor between the other sub-samples. Australian traders rank the importance of the availability of appropriate transport logistics highest (4.3), and German manufacturers lowest (3.2).

The extent of product losses which occur in the foreign business transactions is on average about 3.2% of the merchandise handled. Although this value differs considerably between the German (2.4%) and the Australian (4.1%) sub-samples, the difference is not statistically significant, using the exact Mann-Whitney U test for two independent samples. However, the difference between the manufacturer (2.7%) and the trader (4.5%) sub-sample is statistically significant (99% confidence level). Thus, it appears that manufacturers manage the logistics complexity involved in international business transactions better than traders do. However, this is only true for the Australian sub-sample, where traders lose on average 6.6% and manufacturers 3.1% of their products during international business transactions. In Germany the difference is much smaller: 2.2% for manufacturers and 2.8% for traders, and it is not statistically significant. On the other hand, it is clear that product losses depend on the perishability of a specific product. Table 57 lists the average percentage losses for different product categories. The differences between the individual product groups are overall statistically significant (99% confidence level, using the Monte-Carlo Krustal-Wallis test for k independent samples). The companies which handle mixed, i.e. several different product categories at the same time have the highest loss levels (5.4%), ahead of companies dealing with fruit and vegetables (4.8%), drinks (3.9%), and fish and seafood (3.5%). The lowest loss rates have companies dealing with confectionery and savouries (0.6%), and milk and dairy products (1.0%).

¹¹¹ In this question, multiple responses were possible.

Table 57: Product losses (in %) occurring in international business transactions for different product categories

<i>Product category</i>	<i>Mean (%)±</i>	<i>Std. dev.</i>	<i>n</i>
Mixed†	5.4	5.4	18
Fruits & vegetables	4.8	5.2	27
Softdrinks, beer & wine	3.9	4.0	22
Fish & seafood	3.5	5.6	20
Meat & meat products	2.9	3.4	16
Cereals, bakery goods	2.3	1.8	11
Ready-to-eat meals	1.8	2.4	10
Milk & dairy products	1.0	1.4	14
Confectionery & savouries	0.6	0.6	14
Total	3.2	4.3	152

Notes: † Companies dealing with several of the listed product categories at the same time.

± Differences between product categories statistically significant (99% confidence level), using the *Monte-Carlo Kruskal-Wallis test* for k-independent samples.

Source: Author's compilation from questionnaire responses.

The annual stock turnover during the year prior to the survey does not show statistically significant differences between the sub-samples. Overall, about a third of all sample companies have average stock turnover rates between 6 and 12 times a year. 27% of them clear their warehouses more than 24 times a year, 20% less than 6 times, and 19% between 13 and 24 times. Although here differences among the product categories could have been expected, too, no statistically significant inequalities were found. This may be because the stock turnover depends on perishability of the product which itself is determined by the kind of processing and packaging applied to the product. On the other hand, stock turnover rates are also determined by the intensity of the business activity itself which was not measured in the survey.

The seasonal influence in the main product category in which the surveyed companies operate (as measured by the ratio of the highest to the lowest monthly turnover) is, overall, medium strong. 34% of all companies have a ratio between 1 and 1.5, 28% between 1.5 and 2, 20% greater than 2, and 18% say they have no seasonal influence in their monthly sales at all. Australian companies underlie a statistically significantly larger seasonal influence (99% confidence level, using the exact Mann-Whitney U test for two independent samples) than German ones. However, there are no significant differences between traders and manufacturers. The product categories with the strongest seasonal influences are fish and seafood and confectionery and savouries for the German companies, and fruit and vegetables and fish and seafood for the Australian ones. The product categories with the lowest seasonal influence are meat and meat products for German companies, and ready-to-eat meals for Australian ones. Statistically significant differences (99% confidence level) can be found for drinks (which have a stronger seasonal influence in Germany than in Australia), and fruit and vegetables (for which in Australia the seasonal influence is greater than in Germany) (see Table 58). In summary, it becomes clear that the extent of the seasonal influence differs considerably between product categories and the two countries.

Table 58: Seasonal influence (index values) * in the main product category of German and Australian sample companies

<i>Product category</i>	<i>German</i>	<i>Australian</i>
Fish & seafood	3.00	3.17
Confectionery & savouries	3.00	3.00
Softdrinks, beer & wine†	2.89	2.00
Milk & dairy products	2.43	2.80
Ready-to-eat meals	2.25	1.50
Cereals, bakery goods	2.00	2.00
Fruits & vegetables†	2.00	3.33
Mixed	2.00	2.33
Meat & meat products	1.71	2.36
Total†	2.30	2.66

Notes: * Ratings on a 4-grade rating scale with 1 (no seasonal influence) and 4 (strong seasonal influence).

† Differences between countries statistically significant (99% confidence level), using the exact Mann-Whitney U test for 2-independent samples.

Source: Author's compilation from questionnaire responses.

The importance of the influence of the positive image of the origin of a food product (e.g. a famous holiday area) on its market success was rated homogeneously by all sub-samples with a mean of 3.5 on a 5-grade rating scale. This means that all companies see this aspect as a rather important issue in their foreign marketing activities. Thus, there are no statistically significant differences between the sub-samples.

The use of the origin of a food product in foreign marketing shows more differences between the individual sub-samples. Australian companies highlight the origin of a food product statistically significantly (99% confidence level) more often than German companies (4.4 on a 5-grade rating scale versus 3.6). However, there is no statistically significant difference between manufacturers (3.9) and traders (4.3). Australian traders (4.6) are most keen on highlighting the origin of their food products, whereas German manufacturers are the most reluctant (3.4). Thus, although almost all companies are equally convinced of the positive influence of the declaration of the origin of a food product in foreign marketing, German companies are actually less consistent than their Australian counterparts in putting this concept into practice.

The adaptation of products to local preferences happens overall mostly by adapting the price to the foreign market, followed by adaptations in packaging, and in the recipe. This pattern is homogenous across the individual sub-samples. However, German companies — and above all German manufacturers — adapt their recipes statistically significantly more often (95% confidence level) to the foreign market than their Australian counterparts do. Between manufacturers and traders there are no significant differences. Overall, it becomes clear that price policy is the most intensively used instrument to tailor offers to foreign markets.

Differences in the national food laws cause problems for the foreign business activities of the surveyed companies. The overall mean rating is 3.1 on a 5-grade rating scale. There is no statistically significant difference between German (2.9) and Australian companies (3.3). However, the difference

between manufacturers (3.2) and traders (2.7) is statistically significant at the 95% confidence level, which could have been expected beforehand, since producers are the ones who have to follow foreign standards when manufacturing their products.

Other administrative regulations, such as tariffs, quotas, statistical reporting or tax matters pose also problems in the foreign market activities of the sample companies. Overall, tariff formalities are seen by the surveyed companies as most troublesome (3.1 on a 5-grade rating scale), followed by quota regulations (2.5), tax matters (2.2), statistical reporting (2.0), and other formalities (1.4). The main difference between German and Australian companies is that statistical reporting is significantly (99% confidence level) more a problem for German companies than for the Australian ones (2.4 versus 1.6). Between manufacturers and traders there are no major differences. To sum up, tariffs formalities are the heaviest burden among the administrative regulations in international food product trade for German as well as for Australian companies, but statistical reporting seems to be much more a hassle in Germany than in Australia.

In summary, the survey companies operate in several product groups and processing/packaging categories which highlights the fact that the given sample represents well the diversities of the two countries' food manufacturing sector. The degree of logistical problems is ranked by all companies as relatively important, however it seems that Australian companies depend more on appropriate transport logistics in their foreign partner countries than German companies, probably because they mostly operate in the quite different Asian markets. This fact may also be a reason as to why Australian companies have a higher percentage of product losses in their foreign business activities. Moreover, Australian companies face a stronger seasonal influence in their foreign sales. Australian companies highlight the origin of their food products stronger than German companies do, but the latter on the other hand adapt their recipes more to their foreign markets. For German companies statistical reporting is more troublesome than for their Australian counterparts. The main differences between manufacturers and traders is that the former have fewer product losses in their foreign business transactions, but on the other hand manufacturers are more affected than traders by the complexities resulting from different national food legislations. Overall, it becomes clear that logistical problems can be seen as a significant obstacle for foreign business activities.

3.2.3.6 Trade and payment terms

This sub-section investigates the relevance of internationally standardised trade and payment terms, and the management of exchange rate risks in the surveyed companies. All these problem areas are specific to international business activities and do not occur in companies operating solely in the national market.

The use of INCOTERMS in international business transactions is commonplace in almost all sample companies. Overall, only 10% of the respondents say that they never use these international commercial terms. The INCOTERM the most frequently used is FOB (66% of all respondents use it), followed by CIF (58%), EXW (48%), and CFR (39%).¹¹² This shows clearly that most companies use more than one INCOTERM, the choice of which probably depending on the individual transaction. There are some differences between German and Australian companies: the latter use mostly FOB (73%), CIF (63%), and CFR (58%), whereas German companies use mainly EXW (72%), FOB (59%), and CIF (43%). This may indicate that German companies have a stronger bargaining position than Australian companies, as German companies can make their customers to take on transport costs and risks (in using the FOB term). On the other hand, it seems that German companies — and in particular German traders — use the whole range of the INCOTERMS, whereas Australian companies concentrate almost exclusively on E-, F- and C-terms. Between manufacturers and traders there are no major differences.

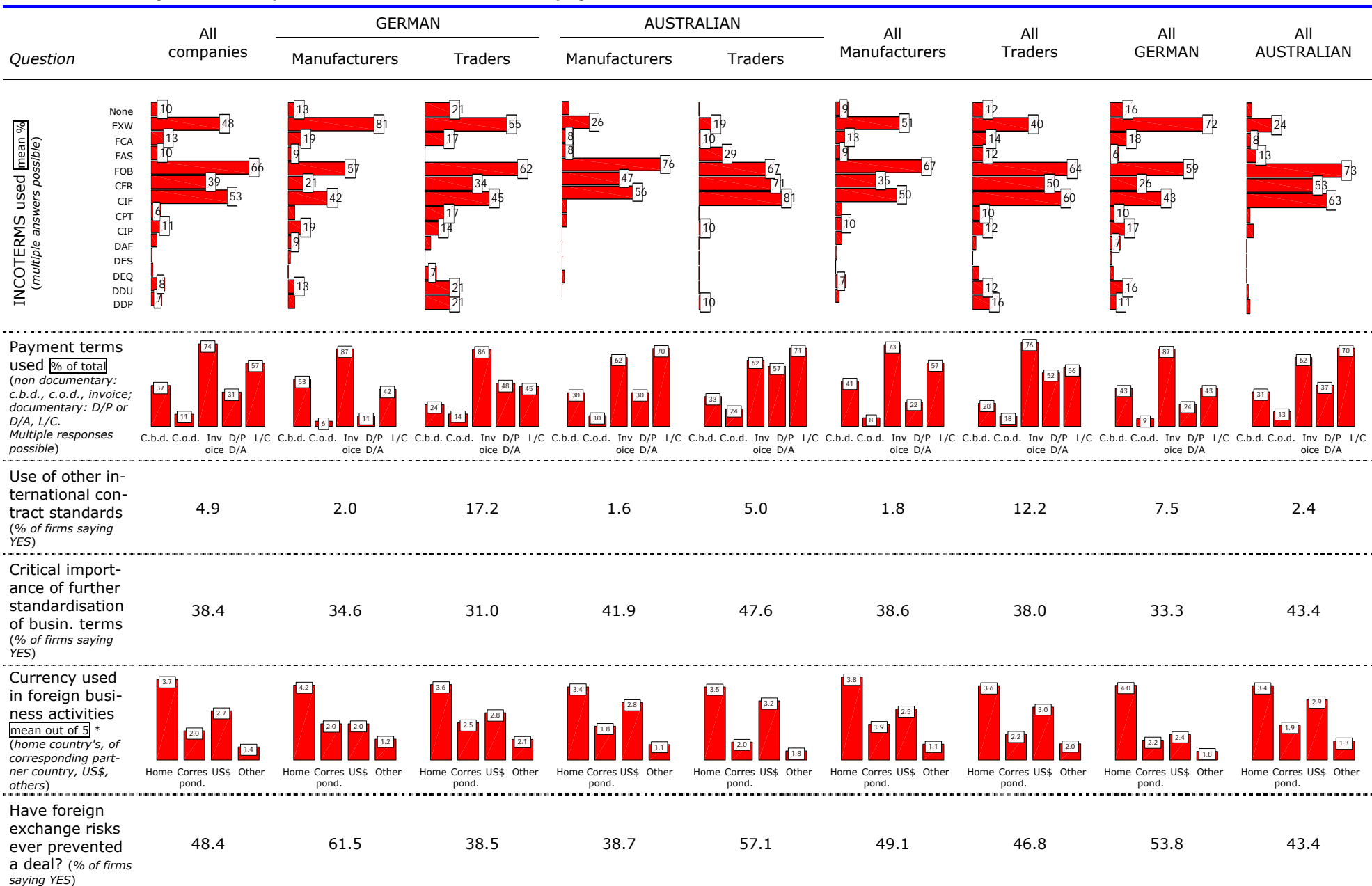
The use of international standardised payment terms in international business transactions are less common. Overall, the *simple invoice* is still the most frequently used payment mode (74% of all sample companies use it). The second most important payment term is *the documentary letter of credit* (L/C) which use 57% of all sample companies. Then comes *cash before delivery* (c.b.d.) with 37% and *documents against payment or acceptance* (D/P, D/A) with 31%. *Cash on delivery* (c.o.d.) is used by 11% of the companies.¹¹³ There is a significant difference between German and Australian companies, with the latter using mostly (70%) the L/C, whereas German companies use in majority (87%) the simple invoice. This suggests that Australian companies are more cautious in the billing of their international deals. Traders differ from manufacturers in so far as they use more D/P, D/A payment terms.

Other international contract standards, such as e.g. the COFEUROP, are used overall by about 5% of all surveyed companies, with no statistically significant difference between German companies (7.5%) and Australian ones (2.4%). There is, however, a statistically significant difference between manufacturers (1.8%) and traders (12.2%), using the exact chi-square test in a 2x2 cross-tabulation. This finding is only true for the German sub-sample where manufacturers hardly use these contract standards (2%), but traders do relatively often (17.2%). In all, it could be that in Europe more standardised contract standards exist, making it easier for German companies to make use of them.

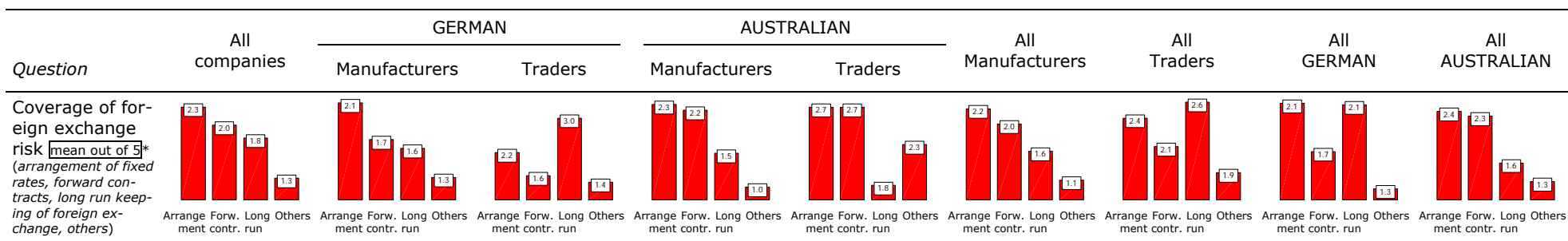
¹¹² In this question, multiple responses were possible.

¹¹³ In this question, multiple responses were possible, too.

Table 59: Survey results — questions related to trade and payment terms



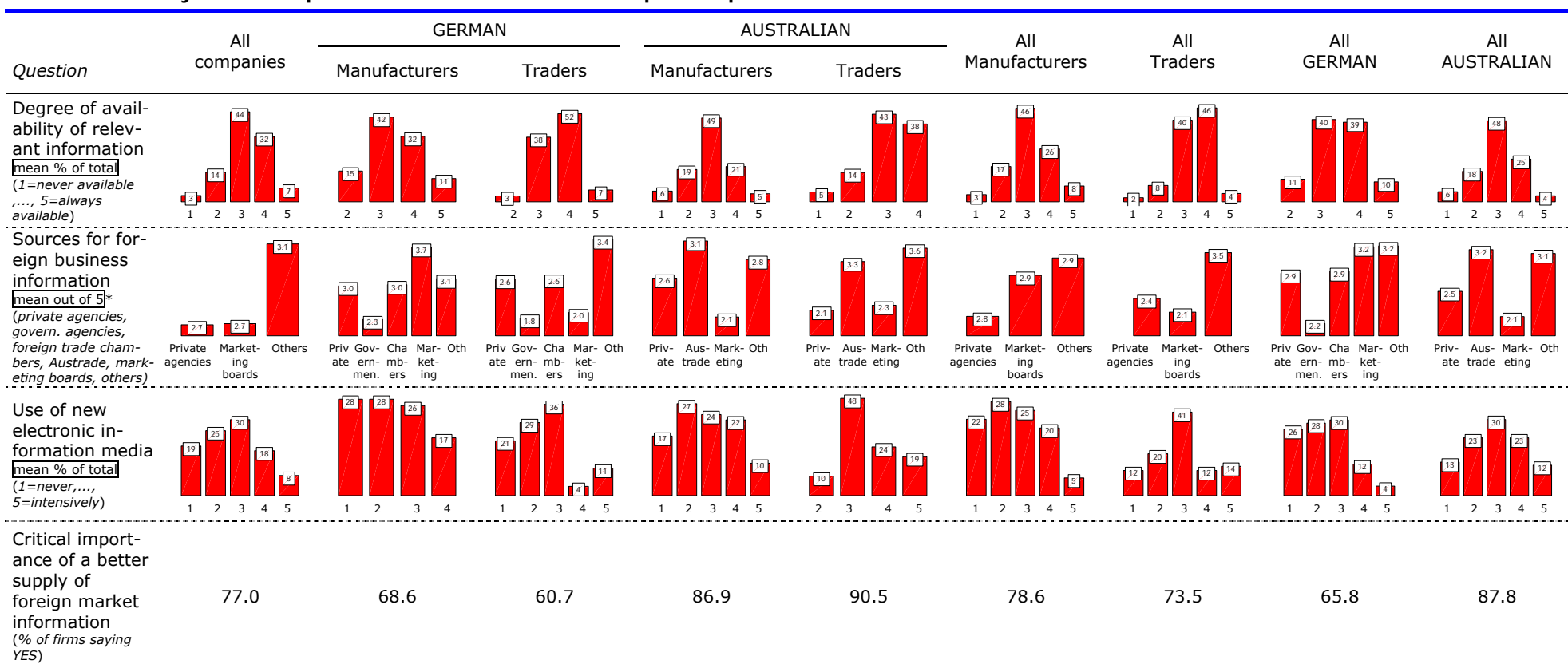
continued



Note: *1=never, ..., 5=always.

Source: Author's compilation from questionnaire responses.

Table 60: Survey results — provision of information in sample companies



Note: *1=never, ..., 5=intensively.

Source: Author's compilation from questionnaire responses.

The critical importance of a further standardisation of international business terms is acknowledged overall only 38.4% of the surveyed companies. There are no statistically significant differences between the sub-samples. German traders see the least importance in it (31.0%), whereas 47.6% of Australian traders — the sub-samples with the highest approval rate — see this point as crucial.

The currency most frequently used in international business transactions is the home currency in both cases, i.e. the DM in Germany and the A\$ in Australia. The second most important currency is the US\$ for both countries, but it is more important for Australian companies (a 2.9 rating versus a 2.4 for German companies on a 5-grade rating scale). At the same time, German companies seem to accept more often than Australian companies invoices written in the currency of the corresponding trading partner country (2.2 versus 1.9). Traders seem to accept more often invoices in foreign currencies than manufacturers which may indicate that traders are less risk averse than them.

That foreign exchange rate risks have already prevented a foreign business deal is committed by 48.4% of all sample companies. There are no statistically significant differences between the sub-samples, however, only 43.3% of Australian companies agree versus 53.8% for German companies, and 49.1% of manufacturers versus 46.8% for traders. German traders are less concerned about foreign exchange risks (only 38.5% agree) and German manufacturers are most (61.5%). Overall, it becomes clear that foreign exchange rate risks are not crucial for the business decisions of German and Australian international food product marketers.

The coverage of foreign exchange rate risks happens in most cases by an arrangement on a fixed exchange rate on the completion of the contract, followed by the use of risk hedging tools such as forward contracts, futures, options, swaps, etc. The overall third most preferred method is the long run acquisition and keeping of foreign exchange accounts. Australian companies have a stronger preference for the use of hedging tools, whereas German companies prefer the keeping of foreign exchange accounts, as the second most used method. This is also the preferred option for traders — in particular German ones — whereas manufacturers arrange mostly fixed rates on the completion of the contract.

In summary, it appears that German companies have more bargaining power, since they seem to be able to transfer the transport cost and risks to their customers. On the other hand, German companies use more risky payment forms than their Australian counterparts. Other standardised international contract standards are also used more often by German companies, but a further standardisation does not seem to be a major preoccupation for the vast majority of the sample companies. The most frequently used currency is the home currency in both countries, but in general, exchange rate risks do not seem to have a great influence on international business decisions. Finally, Australian companies may have a better understanding of, and therefore higher usage rates of, professional exchange rate risk management tools. There are no major differences between manufacturers and traders, which might have been expected beforehand, since the use of international trade, payment and contract terms, and of exchange rate risk management techniques should be independent of the business class.

3.2.3.7 The provision of information

The degree of availability of relevant foreign business information for the sample companies has overall been rated 3.25 on a 5-point rating scale. This indicates that relevant information is available only in a little bit more than half of the cases. There is a statistically significant difference between German companies (3.48) and Australian ones (3.02), i.e. German companies seem generally better informed than their Australian counterparts. The difference between manufacturers (3.17) and traders (3.42) is not statistically significant at the 95% confidence level. Australian manufacturers rate their provision with information lowest (2.98), while German traders rate it highest (3.62).

As main sources for foreign business information are overall used *others* (such as own market research, exchange with partner companies, etc.) with a 3.1 rating on a 5-point rating scale. Then follow marketing boards (2.7) and private information agencies (2.7). For German companies, (semi-)public marketing agencies such as the CMA are equally important than *others* (both 3.2), followed by trade chambers and private information agencies (both 2.9). The CMA is in particular important for German manufacturers (with a 3.7 versus a 2.0 rating for German traders). For Australian companies the government agency AUSTRADE is the most important source of foreign business information (3.2), ahead of *others* (3.1). This agency is equally important for Australian manufacturers (3.1) as for traders (3.2). The Australia commodity marketing boards seem not to be used as an important source of information by the Australian sample companies (only a 2.1 rating).

The use of modern electronic information media, such as the internet, CD-ROMs, online databases, etc. have overall not yet been used intensively at the time of the survey. Overall, the sample companies attribute only a 2.7 rating on a 5-point rating scale, which indicates a use of not even half of the cases. Here, however, Australian companies seem to be more advanced, with a rating of 2.98 versus 2.4 for German companies. This difference is statistically significant at the 99% confidence level. The difference between manufacturers (2.58) and traders (2.96) is not statistically significant. Australian traders are the most intensive users of modern information tools (2.96), whereas German manufacturers use them least (2.32).

The critical importance of a better supply of foreign market information is acknowledged by 77.0% of all sample companies. Australian companies rate this importance statistically significantly (99% confidence level) higher (87.8% approval rate) than German companies (65.8%). The difference between manufacturers (78.5%) and traders (73.5%) is not statistically significant. German traders see the lowest importance in a better supply of foreign market information (60.7%), Australian traders the highest (90.5%). Here again, the survey findings indicate that the less a certain attribute is available, the more it is seen as important by the people in short supply of it.

In summary, it becomes clear that German firms seem to be better informed about foreign markets than Australian firms, and that they use mostly (semi-)public marketing agencies as information sources, whereas Australian firms prefer a government agency. Australian firms use more intensively electronic information media and they rate the critical importance of a better supply of foreign market information higher than German firms. There is no major difference between manufacturers and traders.

3.2.3.8 Government assistance

Financial government assistance is granted to a third (33.3%) of all sample companies. Australian companies (44.0%) receive statistically significantly (99% confidence level, using the exact chi-square test) more often financial grants than German companies (22.2%). Moreover, manufacturers (41.4%) receive more often support than traders (14.3%), with the difference being also statistically significant at the 99% confidence level. Thus, Australian manufacturers are the sub-sample with the highest assistance levels (47.6%), whereas none of the German sample traders have received financial grants.

The support of (semi-)public marketing agencies (for German companies) or commodity marketing boards (for Australian companies) is not rated as very important in both countries. Overall, the results show only a 1.76 rating on the 5-point rating scale. German companies more often make use of the CMA (2.05) than Australian companies do of AUSTRADE (1.48). This difference is statistically significant at the 99% confidence level. The difference between manufacturers (1.87) and traders (1.51) is not statistically significant. German manufacturers (2.30) use the CMA more often than German traders (1.57), as Australian manufacturers (1.50) use AUSTRADE more often than Australian traders (1.43).

The critical importance of a better support through marketing agencies or commodity marketing boards is acknowledged overall by only 44.3% of the sample companies. There is no statistically significant difference between German companies (41.8%) and Australian ones (46.8%), nor between manufacturers (46.8%) and traders (38.8%). German traders see the least importance in it (32.1%), whereas 47.6% of Australian traders — the sub-sample with the highest approval rate — acknowledge the importance of this kind of assistance.

The sort of government assistance desired by the sample companies can be categorised into three main groups. 79 respondents filled in this question, and there are some differences between the individual sub-samples. German manufacturers would most like better *financial trade fair support* (7 out of 26 responses), ahead of the *reduction of administrative obstacles* (tariffs, paperwork, etc.) (5 responses), and more *financial subsidies* (4 responses). The remaining answers are quite mixed, and deal e.g. with the *strengthening of the country-of-origin effect*, more *advice* or the *provision of contacts*. German traders ask mostly for *financial grants* (3 out of 7 responses), *lower taxes* (1) or *less 'red tape'* (1). Australian manufacturers prefer *financial grants* (mostly for travelling and accommodation) (14 out of 31 responses), followed by the *creation of contacts* (6 responses), and the *abolishment of trade barriers and paperwork* (3 responses). The remaining answers are also quite mixed, such as *lower AUSTRADE fees*, *more market access information*, and *faster payments*. Australian traders, finally, ask mostly for *financial grants* (5 out of 15 responses) and the *creation of customer contacts* (4 responses). In addition, *lower AUSTRADE fees* (1), *less paperwork* (1), more *foreign market information* (1) are desired. In all, the sample companies would mainly like more financial grants (for trade fairs by German companies, and for travel and accommodation by Australian companies), the creation of foreign customer contacts, and the facilitation of the administrative procedures involved in international business activities.

Table 61: Survey results — questions related to government assistance for sample companies

Question	All companies	GERMAN		AUSTRALIAN		All Manufacturers	All Traders	All GERMAN	All AUSTRALIAN
		Manufacturers	Traders	Manufacturers	Traders				
Receipt of financial grants (subsidies, refunds, etc.) (% of firms saying YES)	33.3	34.0	0.0	47.6	33.3	41.4	14.3	22.2	44.0
Support by govern. marketing boards/agencies (mean % of total (1=never,..., 5=intensively))									
Critical importance of a better support through marketing boards / agencies (% of firms saying YES)	44.3	47.1	32.1	46.6	47.6	46.8	38.8	41.8	46.8

Source: Author's compilation from questionnaire responses.

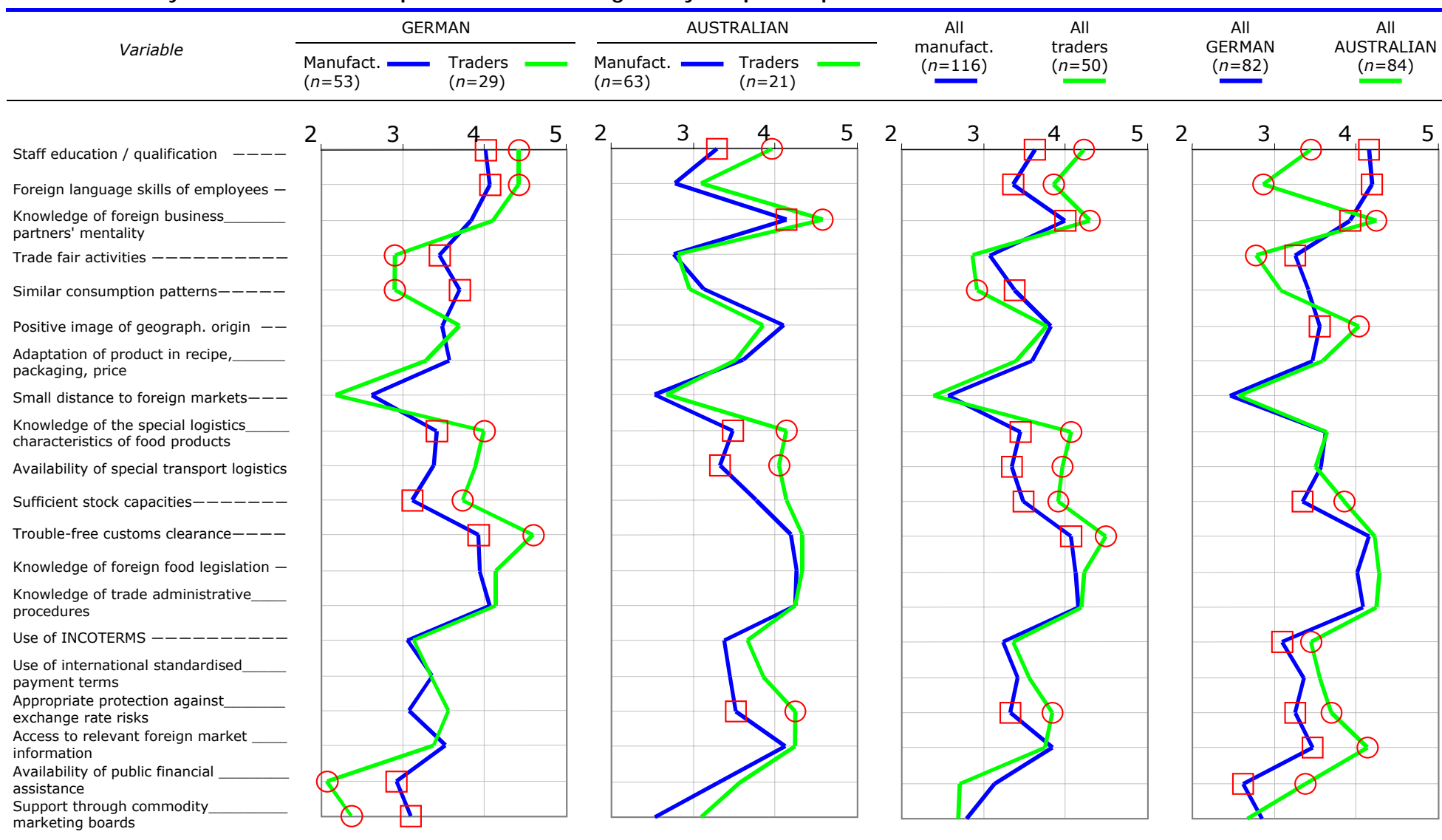
In summary, it becomes clear that Australian companies more often receive financial grants than German ones, and manufacturers more often than traders. The assistance provided by (semi-)public marketing agencies or commodity boards seems not to have a great importance, nor is more assistance of this kind desired by the sample companies. The sort of government assistance mostly asked for by the sample companies are more financial grants for trade fairs and travelling, the creation of foreign customer contacts, and the reduction/abolishment of administrative formalities and tariffs.

3.2.3.9 Overall comparative assessment

The purpose of this question was to obtain an overall assessment of the importance of the most crucial points already investigated in the earlier questions, but relative to each other. Thus it was possible to determine the key variables which the sample companies say would *mostly* affect the success in international food product markets. Apart from a graphical analysis (see Table 62), which visualises clearly the differences between the individual sub-samples, a factor analysis was performed in order to find out whether underlying common factors exist in the sub-samples.

Overall, the most important variables affecting success in international food product markets are *trouble-free customs clearance* (with a 4.19 rating on a 5-point rating scale), followed by the *knowledge of trade administrative procedures* (4.16), the *knowledge of foreign food legislation* (4.14), and the *knowledge of foreign business partners' mentality* (4.09). The variables which least affect success in international food product markets are, according to the sample companies: a *small geographical distance to foreign markets* (2.51), *support through marketing agencies/commodity marketing boards* (2.76), and the *availability of public financial grants* (3.00).

Differences between German and Australian firms exist in several ways. The most important points for German firms are: *foreign language skills* (4.18), ahead of *staff education/training* (4.16) and *trouble-free customs clearance* (4.16). The least important points for German firms are: a *small distance to foreign markets* (2.46), the *availability of public financial assistance* (2.62), and the *support through (semi-) public marketing agencies* (2.84). The most crucial points for Australian firms are: the *knowledge of foreign food legislation* (4.27), the *knowledge of foreign business partners' mentality* (4.25), and the *knowledge of trade administrative procedures* (4.24). Least important for Australian companies are: a *small distance to foreign markets* (2.56), the *support through commodity marketing boards*, and *trade fair activities* (2.77). Statistically significant (95% confidence level, using the exact Mann-Whitney U test) higher ratings of the German companies can be found for the importance of *foreign language skills* of employees (4.18 versus 2.86 for Australian firms), *staff education/qualification* (4.16 versus 3.45), and *trade fair activities* (3.26 versus 2.77). These findings are consistent with the results found in Sections 3.2.3.3 and 3.2.3.4. Australian firms rank the importance of the *knowledge of foreign business partners' mentality* (4.25 versus 3.93), the *access to foreign market information* (4.14 versus 3.46), the importance of the *country of origin affect* (4.04 versus 3.56), the *availability of sufficient stock capacities* (3.86 versus 3.46), the *appropriate protection against exchange rate risks* (3.69 versus 3.25), the *use of INCOTERMS* (3.45 versus 3.09), and the *availability of public financial grants* (3.37 versus 2.62) statistically significantly higher than German firms. These results, too are largely consistent with the results gained in the previous sections.

Table 62: Survey results — overall comparative assessment given by sample companies

Notes: ○ □ indicate statistically significant differences of the group means at the 95% confidence level (exact Mann-Whitney U test results).
1=unimportant, ... , 5=very important.

Source: Author's compilation from questionnaire responses.

Differences between manufacturers and traders exist, too. The most important points for manufacturers are *knowledge of foreign food legislation* (4.16), followed by *knowledge of trade administrative procedures* (4.11), and *knowledge of foreign business partners' mentality* (4.00). The least important variables for manufacturers are a *small distance to foreign markets* (2.57), the *support through marketing agencies/commodity marketing boards* (2.79), and *trade fair activities* (3.08). For traders the most crucial points are *trouble-free customs clearance* (4.48), followed by *knowledge of foreign business partners' mentality* (4.30), and *knowledge of foreign food legislation* together with *staff training/education* (both 4.22). The least important points for traders are a *small distance to foreign markets* (2.38), *trade fair activities* (2.86), and the *existence of similar consumption patterns* in foreign markets (2.92). Traders rate statistically significantly higher (95% confidence level) than manufacturers the importance of *staff education/training* (4.22 versus 3.62), *foreign language skills* (3.86 versus 3.36), the *knowledge of foreign business partners' mentality* (4.30 versus 4.00), an *appropriate protection against exchange rate risks* (3.84 versus 3.32), and all the points concerning logistics: *knowledge of the special logistics characteristics of food products* (4.06 versus 3.45), *availability of special transport logistics* (3.96 versus 3.35), *sufficient stock capabilities* (3.90 versus 3.47), and *trouble-free customs clearance* (4.48 versus 4.07). Manufacturers rank only *the existence of similar consumption patterns* in foreign markets statistically significantly higher than traders (3.38 versus 2.92). In all, the result is that for traders logistics and staff qualification questions are most important and significantly more crucial than for manufacturers. Manufacturers, on the other hand, care most about trade administrative problems and foreign business partners' mentality. However, only the existence of similar consumption patterns in foreign markets is for them significantly more important than for traders.

The differences between German manufacturers and traders are largely the same as those found in the overall sample just described. There is, however, one large dissimilarity in so far as German traders rate the significance of public support, either through subsidies (2.07) or by marketing agencies (2.38) as statistically significantly lower than German manufacturers (2.92 and 3.09). The same is true for trade fair activities which German traders rank also statistically significantly as less important (2.90) than German manufacturers (3.45). These differences cannot be found in the Australian sample nor in the overall sample. Between Australian manufacturers and traders the differences are less distinct than those present in the German sub-sample. Major dissimilarities between the two groups can only be found for the variables *staff education/training*, *knowledge of foreign business partners' mentality*, *knowledge of the special logistics characteristics of food products*, *availability of special transport logistics*, and *appropriate protection against exchange rate risks*. Australian traders rate the importance of all these points statistically significantly higher than Australian manufacturers.

Factor analysis was performed in order to find out whether these numerous results just discussed could be condensed into a few main statements. The *principle component method* with *VARIMAX-rotation* was used. Only factors were extracted with *eigenvalues* greater than one. Factor analysis was applied to the overall sample, and separately to the country and business class sub-samples. For the manufacturer or trader sub-sample within a single country the number of observations n was not large enough to allow for separate analysis. This problem is actually also true for the overall trader sub-sample with n being only 50 which is generally seen as being too small for a factor analysis including 20 variables. Nevertheless, this result is also included in the following Table 63, but it needs to be interpreted with caution. The upper part

of the table shows which variables belong to which factor for each sub-sample. Seven factors were extracted from the overall, the all-German, and the all-traders sample and six factors from the all-Australian and the all-manufacturers sample. The middle part of the table lists the mean rankings for each extracted factor and sub-sample, indicating the importance of each factor. The lower part presents the rotated squared factor loadings in form of the cumulated per cent of variance explained by the factors for each sub-sample. Thus, it can be assessed how much of the sample variation is represented by the extracted factors.

Table 63: Factor analysis* results for all sample companies and subgroups

Variables	Factor membership				
	All (n=166)	All German (n=82)	All Australian (n=84)	All Manu (n=116)	(All Trad) (n=50)
<i>Staff education / training</i>	4	1	3	3	4
<i>Foreign language skills of employees</i>	4	1	3	3	4
<i>Knowledge of foreign business partners' mentality</i>	2	6	3	1	2
<i>Trade fair activities</i>	5	2	4	5	7
<i>Similar consumption patterns</i>	6	5	4	5	5
<i>Positive image of geographical origin</i>	6	5	4	3	5
<i>Adaptation of product in recipe, packaging, price</i>	6	5	6	6	7
<i>Small distance to foreign markets</i>	7	7	4	4	2
<i>Knowledge of special logistics characteristics of food</i>	3	4	5	4	1
<i>Availability of special transport logistics</i>	3	4	1	4	1
<i>Availability of sufficient stock capacities</i>	3	4	5	3	1
<i>Trouble-free customs clearance</i>	1	1	1	1	4
<i>Knowledge of foreign food legislation</i>	1	1	1	1	2
<i>Knowledge of trade administrative procedures</i>	1	3	1	1	3
<i>Use of standardised terms of trade (INCOTERMS)</i>	2	3	2	2	3
<i>Use of international standardised payment terms</i>	2	3	2	2	3
<i>Appropriate protection against exchange rate risks</i>	2	7	2	2	2
<i>Access to relevant foreign market information</i>	1	6	1	1	2
<i>Availability of public financial assistance</i>	5	2	6	5	6
<i>Support through market. agencies/commod. boards</i>	5	2	6	5	6

Factor	Mean rankings (out of 1, ..., 5)				
1	4.08	4.13	4.08	4.03	3.97
2	3.57	2.90	3.56	3.32	3.70
3	3.59	3.51	3.52	3.57	3.70
4	3.66	3.51	3.11	3.12	4.19
5	2.92	3.48	3.75	3.10	3.34
6	3.52	3.70	3.21	3.59	2.69
7	2.51	2.85	-	-	3.12

Factor	Rotated squared factor loadings (cumulated % of variance explained)				
1	11.88	12.50	13.65	13.53	12.97
2	22.32	24.50	26.11	24.40	25.15
3	32.42	36.73	36.90	34.70	36.07
4	42.48	46.15	45.83	44.86	46.42
5	51.63	54.67	53.68	54.02	56.46
6	58.80	62.38	61.49	60.83	66.48
7	64.97	68.78	-	-	73.21

Note: *VARIMAX rotation with Kaiser normalisation; principle component method.

Source: Author's compilation from questionnaire responses.

The factor results for the overall sample show that the most important factor which affects success in international food product markets consists of four variables: *trouble-free customs clearance*, *knowledge of foreign food legislation*, *knowledge of trade administrative procedures*, and *access to relevant foreign market information*. All these variables can be summarised to a factor called **know-how of entering and serving foreign markets**. It has a mean rating of 4.08 on the 5-grade rating scale. The second most important factor (3.66) consists of *staff education/training* and *foreign language skills of employees*. This factor may be called **staff qualification**. The third most important factor (3.59) is formed out of three variables: *knowledge of special logistics characteristics of food products*, *availability of special transport logistics*, and *availability of sufficient stock capacities*. This factor may be called **logistics factor**. The fourth factor (3.57) is made up of the *knowledge of foreign business partners' mentality*, the *use of INCOTERMS*, the *use of international standardised payment terms*, and the *appropriate protection against exchange rate risks*. This factor is similar to the first one but whereas the first factor describes more fundamental foreign marketing knowledge, the focus of this factor lies more on the technical details of handling foreign deals. It may thus be called **technical know-how factor**. The fifth factor (3.52) consists of *similar consumption pattern in the foreign market*, the *positive image of the geographical origin of a food product*, and the *adaptation of the food product in recipe, packaging, and/or price to the foreign market*. This factor may be summarised as the **consumption similarity factor**. The sixth factor (2.92) is formed of *trade fair activities*, the *availability of public financial assistance*, and *support through marketing agencies/commodity marketing boards*. It may be given the name **assistance factor**. The least important factor (2.51) consists of only one variable: a *small geographical distance to foreign markets*, and it can therefore be called the **geographical distance factor**.

The factor results for the sub-samples differ considerably. For German companies the most important factor (with a mean 4.13 ranking) which affects success in international food product markets is made up of *staff education/training*, *employee's foreign language skills*, *trouble-free customs clearance*, and the *knowledge of foreign food legislation*. The second most important factor (3.70) consists of the *knowledge of foreign business partners' mentality* and the *access to relevant foreign market information*. On the contrary, for Australian companies the most important factor (4.08) is composed of five variables: *availability of special transport logistics*, *trouble-free customs clearance*, *knowledge of foreign food legislation*, *knowledge of trade administrative procedures*, and *access to relevant foreign market information*. The second most important factor (3.75) for Australian companies consists of *the knowledge of the special transport logistics characteristics of food products* and the *availability of sufficient stock capacities*. These results confirm that the big difference between German and Australian companies is that for the former staff qualification is one of the most crucial points, whereas for the latter logistical aspects are more important. There is another big difference concerning the *appropriate protection against foreign exchange rate risks*, which for German companies belongs to the least important factor (together with a *small geographical distance to foreign markets*), whereas for Australian companies it is part of the third most important factor (together with the *use of INCOTERMS* and the *use of international standardised payment terms*). With regard to manufacturers, it becomes clear that apart from the most important (4.03) foreign market entering and serving know-how factor which consists of *knowledge of foreign business partner's mentality*, *trouble-free customs clearance*, *knowledge of foreign food legislation*, *knowledge of trade administrative procedures*, and *access to relevant foreign market information*, the second most important point (3.59) is *the adaptation of the product in recipe, packaging, and/or price to the foreign*

market. The least important factor (3.10) consists, as before, of *trade fair activities, similar consumption patterns in the foreign market, and the support through either public subsidies or through marketing agencies/commodity marketing boards*. The results for the trader sub-sample are very much similar to the ones of the German sub-sample, but as mentioned before, they need to be treated cautiously due to the small sample size.

In summary, it becomes clear that, overall, the biggest obstacle for food companies engaged in international food marketing activities lies in the *actual knowledge of how to enter and to serve a foreign market effectively* (how to avoid customs troubles, how to adapt to foreign food legislation, and how to obtain crucial foreign market intelligence), followed by *staff qualification* (appropriate training and foreign language skills), and the mastering of *logistics* (the knowledge of the particularities of the food product, and the availability of suitable facilities). The distance to a foreign market either geographically or in terms of the existence of a similar consumption environment as in the home market seem to matter least as success factors. The big difference between German and Australian companies is that for the former staff qualification is one of the most crucial points, whereas for the latter logistics aspects are more important. Moreover, exchange rate risks are much more important for Australian companies, indicating that they do not enjoy the advantage of doing most of their business in a fixed exchange rate market environment. For traders, staff qualification questions and logistics are most important and significantly more crucial than for manufacturers. Manufacturers, on the other hand, care most about trade administrative problems and foreign business partners' mentality. Trade fair activities seem to be only of some importance for German manufacturers and the assistance through either governments or (semi-)public marketing agencies or commodity marketing boards is rated as not being crucial for companies operating in international food product markets.

3.2.3.10 The relationship between success factors and foreign business performance

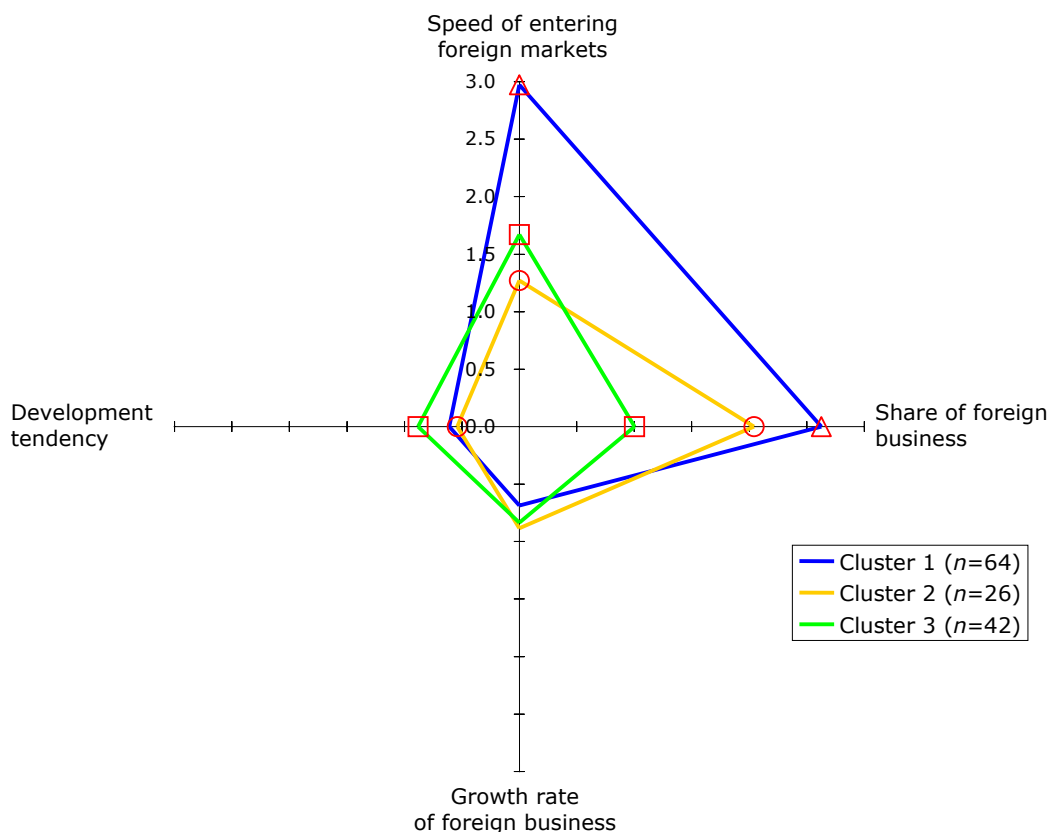
This section attempts, as a last analysis, to investigate whether there is any relationship between the foreign business performance of the sample firms, as measured according to the criteria outlined in Section 3.2.3.2, and the factors the firms claim are important for foreign market success. That is, do more successful companies rate the importance of some factors significantly differently from firms which are less successful? In order to investigate this relationship, first a cluster analysis was performed to identify groups ('clusters') of companies which are similar in their foreign performance patterns. Then, multiple discriminant analysis was used to check for the existence of factors (from the one just discussed in the section before) which discriminate against the foreign performance clusters, for all companies and for each sub-sample.

Clusters of foreign business performance were identified by using four variables which represent the different dimensions of the success concept (as discussed in Section 3.2.3.2): the (relative) *speed of foreign market entering* (i.e. the ratio of the length of foreign business activities to corporate age), the foreign *trade share* (the mean of import and export share in total business turnover), the foreign business *growth rate* (during the last three years), and the *development tendency* of the foreign business activities (as measured as the mean of the current and the expected future development tendency). All variables were measured on a 3-point rating scale, i.e. the original variables were transformed into three simple categories: 'late expander' (0 to 0.33 ratio values), 'medium fast expander' (0.34 to 0.66), and 'fast expander' (0.67 to 1.0) for the speed of entry into foreign market variable; 'little' (<10% in total turnover), 'medium' (10%-49.9%), and 'high' (≥50%) for the trade share variable; 'declining' (<0%), 'stagnant' (=0%), and 'growing' (>0%) for the growth rate variable; and 'declining' (mean ratings of <3 on the 5-point rating scale), 'constant' (a mean rating of 3), and 'growing' (mean ratings of >3) for the development tendency variable. The transformation of the variables onto a 3-point scale had the advantage of measuring all success dimensions on the same scale, which made a standardisation of the variables unnecessary, and it eliminated outliers which can seriously affect cluster results. First, hierarchical cluster analysis (*Ward's* method) was used to determine the optimal cluster number, using the *agglomeration coefficient* as a stopping rule. The largest percentage change in this coefficient occurred from the 4 cluster to the 3 cluster solution, suggesting 3 as the optimum number of clusters. Then non-hierarchical *K*-means clustering was performed, using the results from the hierarchical cluster analysis as initial cluster seeds, to determine the optimal cluster structure. Figure 21 shows the identified cluster solution.

Three patterns of foreign business success resulted from the cluster analysis. The first cluster of companies ($n=64$) is characterised by a high trade share and a high speed of entry into foreign markets. Moreover, the ratings on these two variables are statistically significantly (95% confidence level using ANOVA with post hoc tests) higher than the ones for the other two clusters. On the other hand, cluster 1 displays the lowest growth rate (but the difference to the other clusters is not statistically significant) and also one of the lowest ratings on development tendency. This cluster may thus be characterised as most *foreign business-oriented but mature*. The second cluster of companies ($n=26$) is characterised by entering foreign markets comparatively late, but having the second highest foreign trade share. In addition, companies belonging to this cluster have enjoyed the highest growth rates during the last three years (though this difference is not statistically significant), but their development tendencies are the lowest among all companies. Cluster 2 companies may thus be characterised as a *late but successful movers*. The

third cluster ($n=42$) consists of companies which expand at average speed into foreign markets, but have the lowest trade shares of all companies. On the other hand, these companies rank highest in development tendency, and second highest in growth rate (even if this difference is not statistically significant). Cluster 3 companies may thus be characterised as *low involved but high potential*. A closer look at the exact cluster structure (see Table 64) reveals that almost all sample trading companies belong to cluster 1, and 28 of the manufacturers. Moreover, companies with this specific foreign performance pattern can be found in almost equal numbers in the German and Australian sub-sample. Cluster 2 is predominately a German manufacturer one, whereas cluster 3 may be described as dominated by Australian manufacturers.

Figure 21: The three foreign business success firm clusters in the four-dimensional success space



Note: Using first hierarchical cluster analysis (Ward's method) to determine the optimal cluster number and then non-hierarchical K -means clustering for determining the optimal cluster structure.

○□▷ indicate statistically significant differences of the cluster means at the 95% confidence level (ANOVA with post hoc tests).

Source: Author's compilation from questionnaire responses.

Table 64: Cluster structure and labels

		n				Total
		Germany		Australia		
Cluster	Label	Manufacturers	Traders	Manufacturers	Traders	
1	Most foreign business-oriented but mature	10	21	18	15	64
2	Late but successful mover	16	1	9	-	26
3	Low involved but high potential	19	1	21	1	42

Source: Author's compilation from questionnaire responses.

Attributing different success labels to the individual clusters seems difficult. Yet, in terms of a 'business life cycle model', cluster 1 appears to be the most advanced in foreign marketing, cluster 3 the least advanced, and cluster 2 lies somewhere in between. Companies which have expanded quickly into foreign markets and which now do a significant share of their business in foreign countries may be called successful, even if their foreign business growth may have slowed. Cluster 1 may thus be seen as a benchmark for the other two clusters each of which is characterised by a different foreign expansion pattern.

Multiple discriminant analysis was used to explore whether any factors exist, the importance of which are rated significantly differently among the identified foreign business performance clusters. First, all factors were tested for normality, using the Kolmogorov-Smirnov Test. As it turned out, all factors proved to be sufficiently normally-distributed, allowing for their use in discriminant analysis. Separate discriminant models were estimated for the overall sample, the German and the Australian sample, using these factors. For the trader sub-sample the sample size n was too small, thus not allowing for the estimation of a separate discriminant model. Therefore, with no direct comparison possible, a separate model for the manufacturer sample is not presented in the following either.

Table 65: Discriminant analysis results for all sample companies ($n=132$)

Factors	Standardised canonical coefficients			
	Steps	n	Function 1	Function 2
3 (<i>Logistics</i>)	(1)		.782	-.625
4 (<i>Staff education / training</i>)	(2)		.591	.808
Eigenvalue			.137	.008
Percent of variance			94.8	5.20
Canonical correlation			.348	.087
Wilks' Lambda			.873	.992
Chi-square			17.51	.968
Significance			.002	.325
Group centroids:				
(1)		64	.336*	-.004
(2)		26	-.002	.174
(3)		42	-.499*	-.005
Percent of correct classification				55.3%
Proportional chance classification				37.5%
Press's Q statistic				46.15**

Notes: *Differences statistically significant between the marked centroids (95% confidence level using ANOVA with post hoc tests).

**Statistically significant at the 99% confidence level.

Source: Author's compilation from questionnaire responses.

Results for the overall sample (see Table 65) suggest that there are two main factors which discriminate between the three clusters. First, the *logistics factor* and the *staff education/training factor* separate cluster 1 from the two other clusters, and in a statistically significant way in particular from cluster 3 (95% confidence level using ANOVA with post hoc tests). The discriminant function 1 is statistically significant (99% confidence level) and explains 94.8% of the total sample variance. In this function the logistics factor takes the highest discriminant weight, indicating that logistics, ahead of staff education/training, is considered by cluster 1 companies as the most crucial factor affecting success in foreign markets,

i.e. by the companies characterised by the highest levels of expanding speed into foreign markets and foreign trade shares. Discriminant function 2, which should separate cluster 2 from cluster 3, is not statistically significant, thus underlining the assumption that these two clusters are not very different with respect to their foreign business performance. Overall, the estimated discriminant model can be considered as valid and useful as its classification proprieties are statistically significantly better (99% confidence level, using Press's *Q* statistic) than pure chance classification. On the other hand, a mere rate of 55.3% of correctly classified companies is from a practical significance point of view not satisfactory, thus the model may not be seen as a strong proof of the findings. However, in general, it does confirm the results from the previous sections in that logistics and staff qualification are the most important levers in the international food product business.

Table 66: Discriminant analysis results for all German companies ($n=68$)

Factors	Standardised canonical coefficients			
	Steps	<i>n</i>	Function 1	Function 2
1 (Staff education / training)	(1)		.801	.607
2 (Trade fair activities, public assistance)	(2)		-.681	.739
Eigenvalue			.259	.024
Percent of variance			91.6	8.4
Canonical correlation			.453	.152
Wilks' Lambda			.776	.977
Chi-square			16.33	1.502
Significance			.003	.220
Group centroids:				
(1)		31	.513*	.005
(2)		17	-.191	-.254
(3)		20	-.633*	.132
Percent of correct classification				55.9%
Proportional chance classification				35.7%
Press's <i>Q</i> statistic				15.56**

Notes: *Differences statistically significant between the marked centroids (95% confidence level using ANOVA with post hoc tests).

**Statistically significant at the 99% confidence level.

Source: Author's compilation from questionnaire responses.

Results for the German sub-sample (see Table 66) suggest that staff education/training is the most crucial factor which separates cluster 1 from the other two clusters. The estimated discriminant function is statistically significant (99% confidence level) and explains 91.6% of the sample variation. Factor 2, i.e. trade fair activities and public assistance, is the one that takes the main weight in discriminant function 2, which separates cluster 2 from cluster 3 companies. This function is, however, not statistically significant, confirming as above that cluster 2 and cluster 3 companies are too similar in their foreign business success pattern. Overall, the estimated discriminant model classifies 55.9% of the companies correctly, which is statistically significantly more than proportional chance classification, albeit the rate is not satisfactory either. In all, it becomes clear that successful German companies rate the importance of staff training/education statistically significantly higher than less successful companies.

Table 67: Discriminant analysis results for all Australian companies (n=64)

Factors	Standardised canonical coefficients			
	Steps	n	Function 1	Function 2
3 (Staff training, knowledge of foreign languages and mentality)	(1)		1.000	-
Eigenvalue			.193	-
Percent of variance			100.0	-
Canonical correlation			.403	-
Wilks' Lambda			.838	-
Chi-square			10.787	-
Significance			.005	-
Group centroids:				
(1)		33	.403*	-
(2)		9	-.188	-
(3)		22	-.527*	-
Percent of correct classification			57.8%	
Proportional chance classification			40.4%	
Press's Q statistic			24.50**	

Notes: *Differences statistically significant between the marked centroids (95% confidence level using ANOVA with post hoc tests).

**Statistically significant at the 99% confidence level.

Source: Author's compilation from questionnaire responses.

Results for the Australian sub-sample (see Table 67) show once again that staff training, here combined with the knowledge of foreign languages and of foreign business partner's mentality, separates cluster 1 companies — i.e. the more successful companies — from cluster 2 and cluster 3 companies. The estimated discriminant function is statistically significant (99% confidence level), but the Australian sample data reject the estimation of a second discriminant function. Here again the classification power of the estimated discriminant model is statistically significantly higher than proportional chance classification, but with only 57.8% of all companies correctly classified the practical significance of the model may not be seen as satisfactory. Nevertheless, the findings underline the importance of the staff training/education factor which consistently discriminated between companies which expand rapidly into foreign markets and which have high foreign trade shares from companies with more passive expansion patterns.

In summary, cluster analysis yields three distinct groups of companies which are different in their foreign business performance measured in four dimensions: the (relative) speed of entering foreign markets, the trade share, the past foreign business growth rate, and the (current and future) development tendency. Cluster 1 may be called *most foreign business oriented but mature* and is characterised by the highest level of expanding speed into foreign markets, high foreign business shares, but low growth rates and development tendencies. Cluster 2 companies are *late but successful movers*, characterised by low expanding speed levels, average foreign trade shares, but comparatively high growth rates and development tendencies. Cluster 3 may be given the name *low involved but high potential*, since these companies have the lowest foreign trade shares but the highest development tendencies, with average expanding speed and growth rates. Multiple discriminant analysis was used to identify those factors which affect success in international food product markets and which are rated significantly differently between the three clusters. The results consistently show that statistically significant differences exist only between cluster 1 and the two other clusters but not between cluster 2 and cluster 3. Overall, the *logistics factor* and the *staff*

education/training factor discriminate between cluster 1 and the other two clusters' companies, with cluster 1 companies rating the importance of these factors higher than the companies belonging to cluster 2 or 3. German cluster 1 companies rate the importance of staff education / training statistically significantly higher than cluster 2 and 3 companies. The importance of trade fair activities and public support is, on the other hand, rated as less important by the more successful German companies than by the less successful ones. Australian cluster 1 companies, too rate staff training/education combined with the knowledge of foreign language skills and of foreign business partner's mentality as more important than the companies from the other two clusters. In all, it becomes clear that staff education/training (which in Australia includes foreign language skills and knowledge of foreign business partner's mentality) and logistics are the most important factors affecting success in international food product markets.

3.2.4 Summary

A survey of international food product marketers from Germany and Australia was conducted in order to find answers to the question of which factors affect success in international food product markets. Out of 1 298 companies that were contacted in November 1998 (Germany) and July 1999 (Australia), 166 usable questionnaires were obtained. The responses were analysed separately for the overall sample, German and Australian companies, all manufacturers and traders, and for manufacturers and traders alone from each country. Given the small sample relative to the sector sizes, the representativeness and generaliseability of the survey findings may be seen as low, however, from a statistical point of view, $n=166$ is large enough to achieve statistical significance, especially if the investigated effects can be assumed to be structural for the food product sector and independent of the country or of business class.

Multivariate analysis techniques have been used to analyse the survey data and to identify the key factors that affect success in international food product markets of the sample companies. Apart from tests for differences in group means (t - and F -tests, non-parametric tests, and chi-square tests), cluster analysis, factor analysis, and multiple discriminant analysis have been employed. Factor analysis can be used to condense the information contained in a large number of variables, which are bundled into a smaller set of factors representing underlying dimensions. Cluster analysis' primary purpose is to group objects based on the characteristics they possess in a way that the resulting clusters exhibit high internal (within-cluster) homogeneity and high external (between-cluster) heterogeneity. Thus, factor analysis condenses variables into a few factors and cluster analysis classifies objects into a few groups. Both techniques allow for the identification and description of structures in complex data. Multiple discriminant analysis, on the other hand, is a dependence technique which can be applied in situations where a relationship should be predicted or explained which affect the category in which an object is located. It aims to identify variables that are suitable for predicting the group membership of an object and provides measures to describe the relative importance of independent variables in this procedure, and the discriminatory power of the estimated function as a whole.

General company characteristics, in the survey results, show that German companies, in general, are larger, older, more productive, they are more often publicly listed, they tend to be importers (in particular traders), they operate mostly in European markets, and they are less consumer-oriented than Australian businesses. Moreover, German responses reflect attitudes from functional (i.e. export or sales) managers. The responses of Australian companies, on the other hand, express a more general management background (i.e. managing directors, or CEOs). Australian companies have their main foreign markets in Asia. The main structural differences between manufacturers and traders are, that manufacturers generally seem to have higher corporate ages, they are larger in size, and they are more export-oriented than traders.

Foreign business performance or 'success' is complex to measure, since this concept is multidimensional in nature. Nevertheless, the survey results suggest that trading companies start significantly faster with foreign business activities than manufacturing companies, but that German manufacturers are even significantly slower than Australian ones. German companies (and in particular traders) are more import-oriented, whereas Australian businesses are more oriented towards exporting. There is no statistically significant difference in the past growth rates between German and Australian companies, but the latter rate their current and medium-term future business development tendencies significantly more positively.

Foreign business qualification findings show that German companies have relatively fewer staff dealing with foreign business activities. In both countries about 40% of the employees hold a university degree, which is most likely a business/economics one. Furthermore, about 40% of the companies have never used any sort of further specialised job training for their employees, but if they do, German companies generally tend to choose private institutions, whereas Australian companies rely more on government programs. Employees who deal with foreign customers/suppliers in Germany know significantly more foreign languages and master these significantly better than employees in Australian companies. On the other hand, Australian companies rank the critical importance of foreign language skills higher than German ones, despite the fact that English may be the most important business language in the world. The importance of the knowledge of foreign business partners' mentality is rated by Australian companies significantly higher than by German companies, although there does not seem to be a great difference in the knowledge level between the two countries. This may be caused by the fact that Australian companies do most of their foreign business in Asian countries, i.e. in a, in general, culturally different environment. Between the two business classes, there are no major structural differences, apart from the fact that traders seem to rank the knowledge their employees have about their foreign business partners' mentality significantly higher than manufacturers do. However, this finding may be due to the fact that sample trading companies are more involved in foreign business than manufacturers and therefore they have more contact to foreign customers or suppliers.

Trade fair activity findings reveal that the only significant difference between German and Australian companies is the higher participation rates at trade fairs of the former. Moreover, German companies exhibit strongly in the home country, whereas Australian ones hardly exhibit in Australia. The most important purpose of trade fairs in both countries is the 'making, keeping or improving of contacts'. There is no major difference concerning trade fair expenses and staff use, however significantly fewer Australian companies prefer individual stands than German companies. The general difference between

manufacturers and traders is that the former mostly take part in trade fairs as exhibitors, whereas traders are mostly visitors. Manufacturers spend more on trade fairs, employ less staff, and receive more financial grants for participation from governments.

Food product related questions reveal that the survey companies operate in several product groups and processing/packaging categories which highlights the fact that the sample represents well the diversities of the two countries' food manufacturing sectors. The degree of logistical problems is ranked by all companies as relatively important, however it seems that Australian companies depend more on appropriate transport logistics in their foreign partner countries than German companies, probably mostly because they operate in the quite different Asian markets. This fact may also be a reason why Australian companies have a higher percentage of product losses in their foreign business activities. Moreover, Australian companies face a stronger seasonal influence in their foreign sales. Australian companies highlight the origin of their food products more than German companies, which on the other hand adapt their recipes more to their foreign markets. For German companies statistical reporting is more troublesome than for their Australian counterparts. The main differences between manufacturers and traders is that the former have fewer product losses in their foreign business transactions, but on the other hand manufacturers are more affected than traders by the complexities resulting from different national food laws. Overall, it becomes clear that logistical problems can be seen as a significant obstacle for foreign business activities.

Trade and payment terms related questions reveal that German companies appear to have more bargaining power, since they seem to better transfer the transport cost and risks to their customers. On the other hand, German companies use more risky payment forms than their Australian counterparts. Other standardised international contract standards are also used more often by German companies, but a further standardisation does not seem to be a major preoccupation for the vast majority of the sample companies. The most frequently used currency is the home currency in both countries, but in general, exchange rate risks do not seem to have a great influence on international business decisions. Finally, Australian companies may have a better understanding of, and therefore have higher usage rates of, professional exchange rate risk management tools. There are no major differences between manufacturers and traders, which might have been predicted beforehand, since the use of international trade, payment and contract terms, and of exchange rate risk management techniques should be independent of the business class.

Foreign market information seems to be better available in German companies which use mostly (semi-)public marketing agencies as information sources, whereas Australian companies prefer government agencies. Australian companies use modern electronic information media more intensively and they rate the critical importance of a better supply of foreign market information higher than German companies. There is no major difference between manufacturers and traders.

Government assistance, in form of financial grants, is received more often by Australian companies than by German ones, and by manufacturers more often than by traders. The assistance provided by (semi-)public marketing agencies or commodity marketing boards seems not to have a great importance, nor is more assistance of this kind desired by the sample companies. The sort of government assistance mostly asked for by the sample companies are more financial grants for trade fairs and travelling,

the creation of foreign customer contacts, and the reduction/abolishment of administrative formalities and tariffs.

An overall comparative assessment of the different variables makes clear that the biggest obstacle for food companies engaged in international food marketing activities lies in the *actual knowledge of how to enter and to serve a foreign market effectively* (how to avoid customs troubles, how to adapt to foreign food legislation, and how to obtain crucial foreign market intelligence), followed by *staff qualification* (appropriate training and foreign language skills), and the mastering of *logistics* (the knowledge of the particularities of the food product, and the availability of suitable facilities). The distance to a foreign market either geographically or in terms of the existence of a similar consumption environment as in the home market seem to matter least as success factors. The big difference between German and Australian companies is that for the former staff qualification belongs to the most crucial points, whereas for the latter logistics aspects are more important. Moreover, exchange rate risks are much more important for Australian companies, indicating that they do not enjoy the advantage of doing most of their business in a fixed exchange rate environment. For traders, staff qualification questions and logistics are most important and significantly more crucial than for manufacturers. Manufacturers, on the other hand, care most about trade administrative problems and about foreign business partners' mentality. Trade fair activities seem to be only of some importance for German manufacturers and the assistance through either governments or (semi-)public marketing agencies or commodity marketing boards is rated as not being crucial for companies operating in international food product markets.

The relationship between foreign business performance and success factors was explored in identifying three clusters of companies which are distinct in their foreign performance pattern measured by four different variables. Cluster 1 may be called *most foreign business oriented but mature* and is characterised by the highest level of expanding speed into foreign markets, high foreign business shares, but low growth rates and development tendencies. Cluster 2 companies are *late but successful movers*, characterised by low expanding speed levels, average foreign trade shares, but comparative high growth rates and development tendencies. Cluster 3 may be given the name *low involved but high potential*, since these companies have the lowest foreign trade shares but the highest development tendencies, with average expanding speed and growth rates. Multiple discriminant analysis was used to identify those factors which affect success in international food product markets and which are rated significantly differently between the three clusters. The results consistently show that statistically significant differences exist only between cluster 1 and the two other clusters but not between cluster 2 and cluster 3. Overall, the *logistics factor* and the *staff education/training factor* discriminate between cluster 1 and the other two clusters, with cluster 1 companies rating the importance of these factors higher than the companies belonging to cluster 2 or 3. German cluster 1 companies rate the importance of staff education/training statistically significantly higher than cluster 2 or 3 companies. The importance of trade fair activities and public support is, on the other hand, rated as less important by the more successful German companies than by the less successful ones. Australian cluster 1 companies, too rate staff training/education, including the knowledge of foreign language skills and of foreign business partner's mentality, as more important than the companies from the other two clusters.

3.3 Chapter conclusions

The theoretical analysis of the problems involved in the management of exporting or importing of food products shows that higher transaction costs and risks relative to home market business activities may be the main obstacles to companies for not engaging in international marketing activities. From the literature arise several problem areas but it is not clear which ones are actually most important. In order to find an answer to this problem, a questionnaire-based survey of Australian and German businesses involved in the international marketing of food products has been conducted.

The survey results suggest that staff education/training and logistics are the most important factors affecting success in international food product markets. Another main finding of the survey is that problems which occur in the international food business do not depend much on business class – i.e. there are no main differences between manufacturers and traders. Even the differences between Australian and German companies are comparatively small. Thus, the findings may reflect the structural problems that are involved in the international food product business. Also, even though the sample size of the survey is small relative to the industry, the results often show statistical significance. Practical significance can also be seen as high, too, since most findings are in line with previous expectations.

Implications for agribusiness managers which arise from this study are therefore that staff qualification matters strongly when operating in foreign markets and every possible care should be undertaken by companies to recruit well-trained staff and to offer export managers appropriate additional training whenever possible. This finding thus confirms what should be obvious: at the very heart of competitiveness stands the human being with his/her skills to create value, however new and unfamiliar the environment encountered. Recruiting and maintaining well-trained staff is therefore crucial even for food companies which are generally considered as low-tech and low-skill. A second important implication for food businesses arises from the fact that the ability to manage logistics (i.e. to market perishable products over long distances) indeed discriminates between more and less successful enterprises. Knowing the product and its technical characteristics, for example in terms of how product quality is affected by long distance transport, thus allows export managers to plan better and to execute expansion into remote international markets. Of course, this may be more relevant for some food businesses than for others but delivering acceptable product quality in a continuous way matters to all of them.

Future research should focus on a more detailed analysis of which skills employees precisely need to increase their food companies' competitiveness in foreign markets. Some aspects have already been explored, such as language skills and the knowledge of foreign business partners' mentality. There are other issues which could also be crucial, e.g. negotiation skills. Moreover, future studies should investigate in more detail the logistics problems that are involved in the international food product business, given the lack of literature dealing specifically with this topic, and acknowledging the findings of this survey that logistics turned out to be a major success factor in international food product markets. In a time where (national) manufacturers and retailers forge ever closer alliances in order to master the supply chain as effectively as possible, it is clear that the next stage will be the international one. Thus, future studies must investigate how transport, storage and information exchange – across climate and time zones, with (multiple) border crossings and between (often) different national retailing standards – can be facilitated and optimised.



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