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Determinants of Foreign Direct Investment of OECD Countries 1991-2001*

by

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Abstract

It is the objective of this paper to identify the determinants that led to the increase in worldwide foreign direct investment during the 1990s. The paper also addresses the question whether these factors influenced exports differently. Therefore, using data from 22 countries reporting to the OECD, gravity models for bilateral FDI stocks/flows and exports are estimated, first in a cross-section setting for 1999 and then as a panel data set for the period 1991-2001. In order to control for EU-specific effects, a distinction is made between intra-EU25 observations and observations outside the EU25 area. Regressions are repeated with exports as a dependent variable in order to elaborate how far determinants of trade flows are identical or how far they differ. In the panel context, the results show that a change in total market size is an important aspect that leads both FDI and exports in the same direction. Relative market size influences only exports significantly. Stock market booms boost FDI but not exports. Political indicators and exchange rate changes suggest that exports are demand-driven while FDI is supply-driven. Overall, FDI *and* exports tended to flow relatively less abundantly to distant countries than to nearby countries over the period under consideration. This supports the idea of a complementary relationship between investment and trade. However, this trend is reversed for exports within the EU25 area.

Keywords: foreign direct investment and international trade; multinational firms; models with panel data.
JEL classification: F21, F23, F14, C23.

1 Introduction

The 1980s and 1990s saw an unprecedented rise in worldwide foreign direct investment (FDI). Cross-border investment grew even faster than world GDP and international trade flows (Markusen 1995). Data from the World Investment Report (UNCTAD 2001) show that FDI increased on average by 20% or more in 94 countries for the period 1986-2000. The most active region in the world in this respect was the EU15 area. The group of EU15 countries undertook and received the lion's share of worldwide FDI when investment between current member states is included. Outward FDI stocks – actual foreign assets held by companies of a donor country – rose sixteen-fold from just over 200 billion US$ in 1980 to about 3500 billion US$ in 2000 for the EU15 countries. The corresponding inward FDI stocks – assets of foreign companies as seen by the recipient country – grew in the same period fourteen-fold from again roughly 200 billion US$ to 2900 billion US$. For comparison, foreign direct investment originating in or directed to the United States increased during these 20 years by about half that amount. The situation was more uni-directional for developing countries. They were, as a group, important recipients of FDI in the past. Outward FDI stocks of developing countries, however, were very low until the end of the 1990s. Moreover, regions gained in varying degrees from incoming FDI: most capital from Western countries went to South-east Asia and, to a lesser degree, to Latin America.

Sub-Saharan Africa was more or less excluded from this development. Emerging markets like China, India and Brazil have themselves become important investors in recent years.

As Appendix 1 illustrates, FDI flows grew rapidly in the 1990s, as did FDI stocks. The strong increase in worldwide FDI flows at that time was mainly driven by the growing FDI activity of Western European countries. Investment that took place in Central and Eastern Europe has often been stressed in this context, and a number of authors have concentrated on the explanation of FDI flows to these countries and their impacts (e.g. Brenton *et al.* 1999, Bevan and Estrin 2004, Campos and Kinoshita 2002). However, data of the Organisation for Economic Cooperation and Development (OECD) show that, during the 1990s, Western European countries invested far more between themselves than in states of the former Warsaw Pact (OECD 2003). There is one major difference between worldwide FDI flows and stocks: while total FDI stocks today are larger than ever, FDI flows – financial transactions involved in foreign investment – collapsed after 2000 and have only recently begun to recover.

This study aims to analyse which macroeconomic factors led to the enormous rise (and subsequent fall) of FDI over the period 1991-2001. Apart from management studies that look into specific product markets, empirical research on FDI can be roughly divided into two approaches. When asking why some countries or sectors within a country receive more investment from abroad than others, some economists explain FDI by using fundamental characteristics like market size, factor-price differences and trade costs (e.g. Eaton and Tamura 1994, Graham 1997, Brainard 1997). They typically apply a cross-section approach, although a few authors use panel data for their estimations (e.g. Eaton and Tamura 1994, Egger and Pfaffermayr 2004). Others relate FDI variations over time to changes in macroeconomic variables that show a high degree of volatility, especially exchange rates (Froot and Stein 1991, Blonigen 1997). It is the objective of this paper to combine these aspects within a unified approach. We start with a cross-section model that explains outward FDI using major country characteristics. Then a panel approach is developed in which exchange rates and stock market developments are utilised additionally as explanatory variables. It can be expected that the volatility of these determinants over time may contribute significantly to the explanation of foreign direct

investment across countries in a panel data setting. Appendix 1 suggests, too, that strong macroeconomic forces drive the timing of investment.

The article is organised as follows. In a concise survey of the FDI literature, Section 2 elaborates how FDI is related to macroeconomic factors and how the relationship has been modelled in the literature. Our methodology is presented in Section 3. In the empirical analysis of Section 4, bilateral FDI and exports are modelled econometrically for the period 1991-2001 and for 22 OECD countries. Given the importance of the EU for changes in worldwide FDI, there is also an analysis of whether the determinants of FDI and exports are different from those in other countries. In Section 5, some major conclusions are drawn.

2 FDI and its relation to macroeconomic factors

Foreign direct investment mainly reflects long-term activities of multinational enterprises in order to establish a lasting interest in foreign markets (OECD 1996). A “useful way of thinking” about FDI (McCorriston 1999) is Dunning's Ownership-Location-Internalisation-Paradigm (OLI-Paradigm; see, for example, Dunning 1977). According to Dunning, a producer of goods has three options when it comes to serving a foreign market: he might export, he might license his production to independent firms abroad or he might establish his own subsidiaries in the target country. So, apart from the possibility of licensing, which is excluded here, the entrepreneur has to make a choice between trade and investment. Whereas it may seem that the most natural way to sell products abroad is to export them, FDI has become increasingly important. As trade and FDI are linked via a firm's choice of how to serve a foreign market, the question arises whether FDI is a substitute for trade or a complement of trade. Dunning argues that a firm will favour market access by FDI the more OLI advantages are available to be exploited. Ownership advantages encompass firm-specific advantages like patent rights, strong brands or superior management abilities. These factors are not bound to a specific location, and thus lead to scale economies. They render certain firms more competitive than potential (foreign) rivals. However, for fear of plagiarism, companies with strong ownership advantages are not willing to share their internal knowledge. Location advantages are pull factors that draw firms towards foreign shores. Reasons might be lower wages, easier access to raw materials, a favourable tax environment or

a necessary proximity to markets and consumers. Internalisation advantages relate to the reduction of possible transaction costs by overcoming principal-agent problems. Basically, FDI can be horizontal or vertical. Market-searching, horizontal FDI establishes production facilities or distribution networks in order to serve the target market from within the partner country. Vertical FDI shifts part of the production chain abroad in order to exploit differences in factor prices. In relation to trade in goods, it is often argued that horizontal FDI substitutes for exports while vertical FDI leads to increased trade with intermediate products (Kleinert and Klodt 2000, OECD 2002). It will not be possible in the approach presented here to directly address the question whether FDI and trade are substitutes or complements. The aggregation level is simply too high. However, evidence will be provided on whether trade and investment respond in a similar manner to a given set of explanatory variables.

In the 1980s, the existence of multinational companies was integrated into international trade theory, most importantly by Helpman (1984), Helpman and Krugman (1985), and Markusen (1984). Whereas Helpman and Helpman/Krugman focused on the development of vertical multinationals via factor-price differences between countries, Markusen was more interested in the rise of horizontal multinationals due to trade costs. A key assumption in both models was that, in contrast to national firms, potential multinationals are allowed to possess “headquarter services” (roughly in the sense of Dunning’s ownership advantages) that are modelled as fixed costs and can be exploited through plants at home or abroad at no extra cost. This leads to economies of scale, and thus an incentive to become multinational arises. Through the 1990s, Markusen adapted and extended his basic model with various co-authors. In particular, he tried to integrate the vertical Helpman/Krugman approach into his model of horizontal multinationals to create the “knowledge-capital” model. Its overall structure and key findings are nicely summarised in McCorriston (1999). Very condensed, the model states that in a two-country world with a given level of trade costs (high enough to present a barrier to entry), there will be exclusively horizontal, “market-searching” FDI as long as the two countries are relatively similar in size (that is, GDP) and relatively endowed with skilled and unskilled labour. As differences in factor endowments emerge, there are growing incentives to undertake vertical FDI, culminating in a situation where headquarter services are concentrated in the country with abundant skilled labour and, in the other, production takes place with unskilled labour. With equal factor endowments but a growing

difference in country size, another corner solution arises: one market is so small that (with economies of scale) production there is unattractive; instead, all headquarter services and production are carried out in the large country, the small one being supplied through exports. Various mixed outcomes are possible.

Apart from this trade theory approach, that explains investment flows using specific country characteristics, other strains of theory link FDI to certain volatile factors and shocks in the economy. In this context, is has to be borne in mind that the majority of observed FDI flows are caused by mergers and acquisitions rather than by green-field investment (UNCTAD 1997). Kleinert and Klodt (2000), for example, identify waves of mergers in the 1980s and 1990s for which they hold three interdependent factors responsible: general "globalisation", deregulation and consolidation.

Deregulation of formerly state-controlled sectors in many western industrialised countries was surely an important trigger for mergers and sector consolidation. State protection and subsidies were reduced in shrinking sectors like coal and steel in Europe or the US military industry after the end of the Cold War. On the other hand, deregulation such as the removal of entry-barriers led to the appearance of new players and the subsequent crowding out of others in, for example, telecommunications, finance and the airline carrier industry (Kleinert and Klodt 2000, p. 48). Together with technical progress in the computer industry and telecommunications (think of mobile phones or the internet), deregulation in turn fostered globalisation, which in this context stands for a general reduction of "distance costs", that encompass trade costs as well as investment costs and costs for communication. With rather less certainty, one could also argue that globalisation led to a more acute perception of investment possibilities. It has already been noted by Kindleberger (1969) that firms tend to show a certain kind of myopia with regard to their geographical horizon.

Along with deregulation one might also point to integration, since its manifestations in the forming of the EU single market in 1993, its enlargement in 1994 and 2004 and the introduction of a single currency should have facilitated intra-European investment enormously. European integration did indeed contribute to foreign direct investment by EU countries during the period 1997-2001. Such

effects could be included in an empirical model by using dummy variables or by utilising structural variables of the new member countries if the data were available.

In addition, there is a possible connection between exchange rate fluctuations and FDI. This argument was presented by Froot and Stein (1991), who showed that Japanese FDI into the United States followed surprisingly close movements of the yen-dollar exchange rates in the 1980s. They explained this observation in terms of imperfect capital markets in which lenders with imperfect information tend to charge premiums on credits. However, holders of the appreciating currency experience wealth gains that allow them to finance more of an investment internally instead of relying heavily on expensive credit markets.

Blonigen (1997) follows a different line of argument. In his view, foreign investors who do their calculations in the appreciating currency are prepared to make higher bids than national competitors for a possible acquisition target because the potential gains in the form of new, intangible assets (i.e. ownership advantages) are independent of the excha

affiliate sales (Brainard 1997, Carr *et al.* 2001). The gravity equation in its general form relates bilateral flows of goods or factors from country *i* to country *j* to income (*Y*), population (*P*) and country distance (*D*):

(1) $X_{ij} = f\ (Y_i, Y_j, P_i, P_j, D_{ij})$.

Originating in the work of Tinbergen (1962) and Pöyhönen (1963), its somewhat intuitive econometric specification has been put on a solid foundation in economic theory especially by Linnemann (1966), Anderson (1979) and Bergstrand (1985, 1989). One useful outcome of these derivations is that the gravity equation can be thought of as a reduced-form equation incorporating supply and demand factors of two countries. Helpman (1987) and Carr *et al.* (2001) use gravity equations to test implications that are derived from the general-equilibrium models of Krugman/Helpman and Markusen concerning the volume of trade or affiliate sales respectively. The new trade literature stresses two general conclusions. First, the bilateral trade volume between countries rises when total income grows and when country incomes converge. This effect is due to monopolistic competition and consumer preferences. Secondly, the trade volume also rises when factor endowments diverge because of Heckscher-Ohlin-type specialisation in production. Rising trade or distance costs should dampen trade.

In the presence of multinational companies, the knowledge-capital approach expects analogous results for FDI activity and affiliate sales. Distance costs are an exception, since these are expected to influence multinational activity in more ways than one: some part of high distance costs might be attributed to high investment costs that should negatively influence FDI. Pure trade costs should positively affect horizontal direct investment as a substitute for trade. Vertical direct investment, however, is related to increased trade with intermediate products. Thus, it is posited that rising trade costs lower vertical FDI. In practice, of course, it is hard to separate horizontal from vertical FDI. The significance of variables controlling for relative factor endowments is sometimes taken as an indicator for the presence of vertical FDI (Hanson *et al.* 2003, Egger and Pfaffermayr 2004). In general, results from the empirical literature support the theory. The much-cited cross-section study of Brainard (1997), for example, shows that trade barriers, transport costs and scale economies at the management

level tend to increase the turnover of affiliate companies abroad. On the other hand, affiliate companies are less important in the presence of investment barriers and scale economies at the plant level.

In practice, the gravity equation has been specified in different ways according to authors' needs. Sometimes population is dropped as an explanatory variable, sometimes GDP per capita is used to capture factor-price differences, and sometimes only characteristics of the partner country are taken into account, and so on. This somewhat loose handling of variables may pose problems, as Baldwin and Taglioni (2006) rightly point out in a recent working paper. Here, in order to remain close to the knowledge-capital framework, we follow Carr *et al.* (2001) by taking gravity variables that account for the total market size of two countries, for differences in country size and for differences in skilled labour abundance, indices for trade and investment costs and country distance. In the cross-section estimation, dependent variables are FDI stocks (*FDI*) and exports (*EX*) respectively:

$$(2) \quad FDI_{ij},\ EX_{ij} = f\ (GDPSUM_{ij},\ GDPDIFF_{ij},\ AGRDIFF_{ij},\ DIST_{ij},\ RISK_i,\ RISK_j,\ TREATY_i,\ TREATY_j,\ FREE_i,\ FREE_j,\ TAX_j,\ HIFI_j).$$

Here, *GDPSUM* is the sum of both countries' GDP, controlling for total market size. The expected sign is positive for both *FDI* and *EX*. *GDPDIFF* is an indicator of relative country size in terms of GDP measured as $1 - (GDP_i/GDPSUM_{ij})^2 - (GDP_j/GDPSUM_{ij})^2$. Introduced by Helpman (1987), this term ranges from nearly 0 (high difference in country size) to 0.5 (both countries are of the same size). The expected sign of *GDPDIFF* is positive since convergence in country size should raise horizontal FDI and intra-industry trade. *AGRDIFF* should control for endowment differences in skilled labour; we take the difference in the share of the population in agriculture as a proxy[1]. The difference is expressed in absolute terms in order to keep observations strictly non-negative (see Blonigen *et al.* 2002). Since high endowment differences in skilled labour should encourage vertical FDI, a positive sign with regard to FDI is plausible. The expected sign in respect of *EX* is positive, too, because differences in factor endowments should foster inter-industry trade. *DIST* is the great-circle distance of country capitals. A negative influence of distance on trade flows (and more recently also on FDI) has been

reported in many cross-section studies (e.g. Buch *et al.* 2004, Egger and Pfaffermayr 2004). Variables controlling for the political environment, and thus transport and investment costs come next. In preference, one would use specific indicators like quality of infrastructure, red tape, degree of corruption, etc. in order to identify investment barriers. It is not hard to include these factors in a cross-section study. However, in order to be able to expand the model later to a fixed-effects panel approach, it is preferable to take variables that show some degree of variation over time. Here, meta indices are used that are averages of several single political indicators. They do vary over time and have the additional advantage that they are relatively easy to obtain for many countries.

RISK is an indicator of country risk, ranging from 0 to 100. High values indicate a low country risk. Therefore, its sign is expected to have a positive influence on investment and trade. *TREATY* is the total number of bilateral investment treaties each country has signed with other countries. It controls for investment liberalisation; its expected sign is positive for *FDI* and unspecified for *EX*. *FREE* is an index of economic freedom. It ranges from 1 to 5; higher values indicate less economic freedom. Thus, its expected sign is definitely negative for *EX*. As the index is comprised of costs for both trade and investment, its influence on *FDI* is ambiguous. It is only in the cross-section equations that the maximum corporate tax rate of the target country (TAX) and the degree of its job protection regulations (HIFI) are additionally included[2]. As high corporate taxes reduce profits, the influence of TAX on FDI is expected to be negative. HIFI ranges from 1 to 7, a higher value indicating fewer job protection measures. Since companies are thought to prefer flexible hiring rules, a positive influence of HIFI on FDI is likely.

In a further step, the analysis is expanded to a fixed-effects panel model for the years 1991-2001. Here, the focus is on how changes of determinants influenced the level of investments and export activities over time. In order to check the relevance of relatively volatile macroeconomic factors, we additionally include a stock market indicator, exchange rates and price indices. These variables should account for

[1] The share of the population in agriculture is unlikely to be an ideal indicator of unskilled labour. It would have been preferable to use data from the International Labour Organization (ILO) for skilled labour, as Carr *et al.* (2001) do. However, ILO data exhibit breaks in series within the period 1991-2001.
[2] Statistical tests with data from the sources indicated in Table 2 showed that these variables were not highly correlated with FREE – in contrast to many other political indicators.

possible relative wealth effects along the lines of Froot and Stein (1991), Blonigen (1997) and De Santis *et al.* (2004). Note that the stock market indicator is the only variable that has not yet been derived formally from a general-equilibrium framework: Bergstrand (1985, 1989) incorporates exchange rates and price indices in an empirical specification of the gravity equation in order to control for relative price effects. The dependent variable is first bilateral FDI flows and then bilateral exports. Thus, the panel specification is as follows:

$$(3)\quad FDI^t_{ij},\ EX^t_{ij} = f\ (GDPSUM^t_{ij},\ GDPDIFF^t_{ij},\ AGRDIFF^t_{ij},\ STOCK^t_i,\ EXCH^t_{\$i},\ EXCH^t_{\$j},\ CPI^t_i,\ CPI^t_j,\ RISK^t_i,\ RISK^t_j,\ TREATY^t_i,\ TREATY^t_j,\ FREE^t_i,\ FREE^t_j,\ DIST_{ij}\cdot YD^t).$$

Annual bilateral FDI flows from country *i* to country *j* in period *t*, FDI_{ijt}, and annual bilateral exports, EX_{ijt}, are in 1995 US$. Again, they are explained by the same set of variables. In the following, indices are omitted for convenience. The variables that were already introduced in the cross-section estimation should now be interpreted with regard to changes over time; for example, GDPSUM now stands for market growth rather than a snapshot of market size. However, additional factors are introduced. *STOCK* is the yearly average of a leading stock market indicator in the reporting country, for example the Dow Jones Industrial Average in the USA or the DAX in Germany. As a bullish stock market is supposed to raise the relative wealth of the reporting country, *STOCK* should have a positive effect on FDI flows abroad. There are no predictions for its influence on exports.

$EXCH_{\$}$ is the exchange rate of the reporting or partner countries' currency in respect of the US-dollar. Appreciation of the reporting country's currency presumably raises bilateral FDI because there is a relative wealth effect in favour of the reporting country. The opposite is true for exports: appreciation of the home country's currency makes traded products in the partner country more expensive, thereby lowering import demand. As it can be assumed that many multinational enterprises calculate their overseas transactions in US-dollars, it is not the bilateral exchange rate that is used here. Appreciation of a country's currency in respect of the US-dollar is reflected in a decrease of $EXCH_{\$}$. An increase in either $EXCH_{\$i}$ or $EXCH_{\$j}$ should raise FDI outflows from country *i* to country *j*, while it should lower corresponding exports. $EXCH_{\$}$ enters the equation in nominal terms. Instead of calculating the real

exchange rate, consumer price indices for the reporting and partner countries are included as separate terms, *CPI*. This is done in order to distinguish between external and internal price effects.

3.2 Data

In contrast to much prior research, which relied heavily on data for inward and/or outward FDI of the United States and occasionally other single countries, this study uses data of 22 reporting OECD countries in order to come to more universally applicable results (OECD 2003). This approach is especially interesting with regard to the relative importance that FDI by EU countries has gained in recent years. Countries included in the analysis are listed in Table 1. For the empirical estimation, an unbalanced panel data set is created for the period 1991-2001. This data set is split into two subsets: one for observations where both the donor and the recipient country are members of the current EU25 and one for all other observations.

Table 1: Countries included in the data set

OECD countries reporting bilateral FDI outflows				
Australia	Austria	Belgium-Luxembourg	Canada	Denmark
Finland	France	Germany	Iceland	Italy
Japan	Korea	Netherlands	New Zealand	Norway
Poland	Portugal	Spain	Sweden	Switzerland
United Kingdom	United States			
Destination countries *All of the countries listed above, plus*				
Algeria	Argentina	Baltic Countries	Brazil	Bulgaria
Chile	China	Colombia	Costa Rica	Czech Republic
Egypt	Greece	Hong Kong	Hungary	India
Indonesia	Iran	Ireland	Israel	Malaysia
Mexico	Morocco	Panama	Philippines	Romania
Russia	Saudi Arabia	Singapore	Slovak Republic	Slovenia
South Africa	Thailand	Turkey	Ukraine	United Arab Emirates
Venezuela				

Source: Own compilation.

In order to control for the validity of the panel model, a cross-section estimation for the year 1999 will be presented in the next section based on equation (2). The variables used and the data sources of all variables are summarized in Table 2.

Table 2: Regression variables and where they come from

Name		Source:
FDI outflows	Log of yearly outflows of foreign direct investment from country i to country j (in Mill US$).	International direct investment statistics yearbook, OECD (2003).
Exports	Log of yearly exports from country i to country j (in Mill US$).	Bilateral Trade Database, OECD (2004).
$GDPSUM_{ijt}$	Sum of GDP of reporting country i and partner country j in year t. Values are in logs.	Calculated from data of the World Economic Outlook Database, International Monetary Fund (2004).
$GDPDIFF_{ijt}$	Indicator of relative country size in terms of GDP, measured as $1 - (GDPi / GDPSUMij)^2 - (GDPj / GDPSUMij)^2$; range between 0 (high difference in country size) and 0.5 (countries are of same size).	Calculated from data of the World Economic Outlook Database, International Monetary Fund (2004).
$AGRDIFF_{ijt}$	Absolute difference of shares of agricultural population in the reporting and partner country.	Calculated from data of FAOSTAT.
$STOCK_{it}$	Leading stock market indicator in reporting country i (in logs).	World Federation of Exchanges (2004).
$EXCH_{it\$}$, $EXCH_{jt\$}$	Nominal US$ exchange rate of the reporting country's and partner country's currency resp. A rising value indicates an appreciation of the dollar.	Financial Statistics Yearbook, International Monetary Fund (2003).
CPI_{it}, CPI_{jt}	Consumer price index in the reporting and partner country resp.; base year 1995.	World Investment Indicators Database, World Bank (2004).
$RISK_{it}$, $RISK_{jt}$	Country risk indicator for each country, ranging from 0-100. High values indicate a low country risk.	World Investment Indicators Database, World Bank (2004).
$FREE_{it}$, $FREE_{jt}$	Index of economic freedom[a], ranging from 1.0-5.0. High values indicate low economic freedom.	Heritage Foundation (2005).
$TREATY_{it}$, $TREATY_{jt}$	Total number of bilateral investment treaties of the reporting and the partner country (not necessarily with each other).	World Investment Report, UNCTAD (var.)
TAX_{jt}	Top corporate income tax rate in the partner country.	World Economic Forum (2003).
$HIFI_{jt}$	Hiring and firing practices in the partner country.	World Economic Forum (2003).
$DIST_{ij}$*$YEAR_t$	Dummy variable combining the log of the great-circle distance of capitals with year dummies. Used in order to reveal changing influence of distance in a fixed-effects approach.	Distance of capitals from Byers (1997).

[a] Since this index only starts in 1995, the 1995 values are inserted for the years 1991-1994. This solution is second-best, but the alternatives would have been either to lose these observations or to omit the index.

Source: Own compilation.

4 Econometric results: The determinants of FDI and exports

Based on the methodology and data outlined in Section 3, we now present the econometric results. Determinants of FDI and exports are identified across countries for 1999 and across countries over time, i.e. for 1991-2001.

4.1 Determinants of FDI and exports across countries

Results of the cross-section estimation with fully robust standard errors can be found in Table 3. The positive sign of the coefficient of GDPSUM shows that market size influences FDI stocks positively.

Bilateral investment also rises when the countries are of similar size (positive sign of the GDPDIFF coefficient). Countries tend to invest more in nearby than in distant countries (negative sign of the DIST coefficient). The significantly positive sign of the $RISK_i$ coefficient shows that companies in countries with high political and economic stability undertake more FDI than others. The latter result is somewhat surprising, as all reporting countries are OECD members and therefore stable economies. Moreover, FDI tends to grow in response to market openness of the reporting and the partner country. Within the EU, differences in market openness of the reporting countries have no significant influence on FDI in a European partner country. Given the high level of EU economic integration, this comes as no surprise. Still, openness of the partner country always promotes FDI, even between EU countries. Furthermore, the number of the reporting country's bilateral investment agreements raises FDI stocks abroad. However, according to the results, neither a high corporate tax rate nor tight job protection measures significantly reduce a country's attractiveness to foreign investors. Disappointingly, the variable that should reflect differences in skilled labour endowment, AGRDIFF, is not significant. As it is not plausible that differences in labour availability are not at least partially responsible for international direct investment, AGRDIFF does not seem to be a satisfying proxy variable for labour endowment. The correction of this shortcoming must be left to further research.

With exports as a dependent variable, the results are similar. Market size and relative country size promote exports to the target country, too. On the other hand, the greater the distance between two countries, the less they are going to trade with each other. Overall, political indicators are significant with the expected sign. However, they tend to be less significant for the EU area than for all other observations. This is arguably due to the introduction of the Single Market and the eradication of trade barriers between member states. The significant and negative influence of HIFI on intra-EU exports is surprising. The variable is probably a proxy for an additional influence outside the model. Summing up, the distribution of FDI stocks and exports is explained by country differences in a similar way. This result points to a complementary relationship of FDI and trade rather than a substitutive one. Differentiating between the EU area and the rest of the world, the disparities in the political framework are more pronounced if countries outside the European Community are involved.

Table 3: Cross-section estimation for bilateral FDI stocks and exports 1999

	Regression with fully robust standard errors											
	Dependent variable: **bilateral FDI stocks**						Dependent variable: **bilateral exports**					
	Intra-EU25 investment			Other investment			Intra-EU25 exports			Other trade		
	Coef.		SE	Coef.		SE	Coef.		SE	Coef.		SE
GDPSUM	1.607	***	0.478	1.748	***	0.092	1.776	***	0.175	1.831	***	0.056
GDPDIFF	2.615	**	1.289	5.141	***	0.606	3.458	***	0.484	5.323	***	0.362
AGRDIFF	-1.598		2.911	-0.228		0.635	0.215		0.973	0.060		0.333
DISTij	-1.641	***	0.202	-0.658	***	0.111	-1.068	***	0.095	-0.951	***	0.054
RISKi	0.457	***	0.041	0.249	***	0.036	0.073	***	0.014	0.051	***	0.012
RISKj	0.013		0.036	0.002		0.012	0.028	**	0.014	0.013	**	0.005
FREEi	0.925		0.663	-1.570	***	0.526	-0.419	*	0.234	-1.025	***	0.194
FREEj	-1.142	**	0.550	-1.327	***	0.235	-0.428	**	0.217	-1.082	***	0.109
TREATYi	0.017	**	0.008	0.016	***	0.002	0.004		0.003	0.010	***	0.001
TREATYj	-0.007		0.008	0.001		0.003	0.000		0.003	-0.003	**	0.002
TAXj	-0.008		0.024	-0.025		0.016	0.004		0.008	-0.002		0.008
HIFIj	-0.202		0.164	-0.007		0.092	-0.178	***	0.051	-0.041		0.045
CONS	-31.822	***	6.977	-16.978	***	4.315	2.634		2.795	6.064	***	1.711
N			204			512			247			894
F-Test	F(12; 191)		36.70	F(12; 499)		70.33	F(12; 234)		120.99	F(12; 881)		188.33
R^2			0.70			0.60			0.87			0.76
R^2 (adj.)			0.68			0.59			0.86			0.75

***, **, * = significant at 1%, 5% and 10%-levels.

Source: Own computations.

4.2 Panel specification of the years 1991-2001

The panel-model approach allows many more observations to be used, but it also yields econometric problems with regard to the distance variable in the gravity equation. A fixed-effects regression does not permit the estimation of parameter coefficients. Parameters are absorbed within the group effects. A random-effects specification would allow for parameter coefficients to be estimated but necessitates the assumption that the group effects are not correlated with the explanatory variables. A Hausman test indicates that the random-effects method is not appropriate in our case. As geographic country distance remains unchanged over time, *DIST* cannot be introduced in the panel model as a single variable. Instead *DIST* is made to interact with *t* year dummy variables. This approach enables us to capture the changing influence of *DIST* on the dependent variable over time compared with the base period (Wooldridge 2003, p. 428).

Results are obtained by fixed-effects estimation. Fully robust standard errors are used that correct for heteroskedasticity and, additionally, for possible autocorrelation within panel groups. Results for the

FDI equations are shown in Table 4. Apparently, total market size is the dominating force driving FDI for all groups of observations with coefficients well above unity. An elastic relationship is implied in this case. Relative country size is not significant either for EU25 observations or observations with non-EU countries[3]. Differences in the proportion of the population in agriculture, again used as a proxy for differences in human capital endowment, do not influence FDI flows significantly over time either. On the other hand, stock market developments in the donor country are highly significant for investment that took place in non-EU25 countries by EU25 countries and vice versa. Stock market developments in EU donor countries, however, did not lead these countries to invest more in other EU25 countries.

US-dollar exchange rate fluctuations relative to the reporting country's currency are highly significant as long as we do not focus exclusively on intra-EU25 investment. Appreciation of the US-dollar relative to the reporting country's currency raises FDI in the partner country, while changes in the exchange rates of the partner countries have no effect. Within the EU25 area, the exchange rate of the reporting country's currency with the US-dollar has no significant effect on direct investment. The partner country's exchange rate, however, does have an effect which is significant at the 10% level. Here, a negative sign implies that depreciation of the dollar relative to the partner country's currency raises FDI.

Inflation in the reporting country has a significantly negative influence on FDI if investment does not take place between EU25 members. On the other hand, inflation in the partner country has a significantly positive influence on FDI flows for both country groups.

Most indicators controlling for political influences were statistically significant in the cross-country regressions. This no longer holds in the panel estimations. Although they are not parameters, these variables show relatively little variation over time. It is likely that differences between countries *do* influence FDI, but within the panel model they are captured in the fixed country effects. However, an increase in the number of bilateral investment treaties of the reporting country significantly raises all

[3] Changes in relative country size are significant when the two subsets are merged; however, as they seem to be very different from each other, it might not be appropriate to do so.

other FDI flows significantly. Within the EU25 area, changes in the number of investment treaties do not influence FDI. An explanation might be the possible irrelevance of third-country treaties for intra-EU investment[4].

It is striking that the influence of distance on FDI did change. It became more negative over the sample period. The interaction terms are moderately to highly significant for intra-EU25 investment; for other investment, however, they are only significant for 2001[5]. Buch *et al.* (2004) stress that the coefficient of the distance variable does not measure distance costs per se. A negative sign should rather be interpreted as a tendency to maintain closer economic relations with neighbouring countries than with countries far away. Thus, these results state a tendency over the nineties to conduct relatively less FDI in distant countries. Significantly negative distance coefficients *within* the EU25 area for the years 1993-1998 indicate a concentration of investment flows in the EU15 area.

Comparing these results with those for the export equations in Table 4, we see immediately that, in respect of the within-component, the gravity equation for intra-EU25 observations "fits" much better for exports than it does for FDI: over the period in question, the same variables explain 22% of the within-group variation of FDI flows but 68% of the variation of exports. Market size is also significant for explaining exports in both country groups, as is relative country size. The difference in the share of the population in agriculture is significant for trade flows only within the EU25 area. Stock market developments do not influence exports. This indicates one important deviation from the results for FDI. The influence of exchange rates also differs. As expected, appreciations of the US-dollar relative to the partner country's currency reduce exports to the partner country. However, exchange rate changes of the reporting country's currency are only significant for observations within the EU25 area. Here, a depreciation of the reporting country's currency relative to the US-dollar significantly raises exports, while such changes do not influence observations for "other trade". As in the case of FDI, an increase in the price level of the partner country raises exports. Price increases in the reporting country

[4] However, if standard errors need not account for possible autocorrelation, the coefficient of TREATIESj becomes significantly positive. This result is not reported in Table 4. Bilateral investment treaties CEEC countries established prior to their EU accession might have raised EU-FDI into the new member states.

[5] However, as with relative market size, the distance terms are highly significant and negative when the two data subsets are merged. This finding supports the observation that FDI activity flourished between (future) EU countries and only stresses the need to differentiate between the EU25-area and other investment.

significantly lower exports in all country groups.

Table 4: Fixed-effects panel estimation for bilateral FDI flows and exports 1991-2001

Regression with fully robust standard errors												
	Dependent variable: **bilateral FDI outflows**						Dependent variable: **bilateral exports**					
	Intra-EU25 investment			Other investment			Intra-EU25 exports			Other trade		
	Coef.		SE	Coef.		SE	Coef.		SE	Coef.		SE
GDPSUM	5.174	***	1.563	2.476	***	0.705	0.598	*	0.334	1.724	***	0.286
GDPDIFF	9.764		6.639	3.354		2.493	2.808	**	1.164	3.468	***	0.985
AGRDIFF	5.081		10.952	2.862		3.981	5.711	**	2.258	-0.115		1.094
STOCKi	0.215		0.181	0.480	***	0.090	-0.021		0.031	-0.001		0.028
EXCH$i	0.869		0.573	0.910	***	0.299	0.202	**	0.094	0.064		0.074
EXCH$j	-0.962	*	0.532	0.005		0.085	-0.436	***	0.113	-0.069	***	0.026
CPIi	-0.355		0.851	-3.549	***	0.771	-0.543	***	0.140	-0.517	**	0.213
CPIj	1.085	**	0.513	0.163	***	0.051	0.896	***	0.109	0.123	***	0.019
RISKi	-0.009		0.019	-0.004		0.010	0.003		0.002	0.003		0.002
RISKj	0.011		0.013	0.010		0.007	0.001		0.002	0.012	***	0.002
FREEi	0.410		0.399	0.075		0.352	0.064		0.063	-0.069		0.077
FREEj	0.312		0.296	-0.303		0.211	0.004		0.058	-0.249	***	0.064
TREATYi	-0.006		0.008	0.016	***	0.004	-0.003	**	0.001	0.001		0.001
TREATYj	0.011		0.008	0.000		0.004	-0.005	***	0.001	0.000		0.001
DIST*1992	-0.018		0.022	0.005		0.011	0.002		0.003	-0.004		0.003
DIST*1993	-0.059	**	0.029	-0.018		0.014	-0.010	*	0.005	-0.012	***	0.003
DIST*1994	-0.096	**	0.043	0.000		0.016	0.004		0.008	-0.016	***	0.005
DIST*1995	-0.116	**	0.057	0.000		0.021	0.030	***	0.011	-0.010		0.007
DIST*1996	-0.162	**	0.068	-0.006		0.026	0.034	**	0.014	-0.021	***	0.008
DIST*1997	-0.178	**	0.082	-0.025		0.028	0.041	**	0.018	-0.024	**	0.010
DIST*1998	-0.162	*	0.095	-0.017		0.031	0.049	**	0.021	-0.036	***	0.010
DIST*1999	-0.165		0.108	-0.046		0.034	0.052	**	0.024	-0.050	***	0.012
DIST*2000	-0.149		0.121	-0.057		0.038	0.050	*	0.026	-0.056	***	0.013
DIST*2001	-0.208		0.131	-0.089	**	0.041	0.054	*	0.029	-0.068	***	0.015
CONS	-39.445	***	9.380	-4.761		6.148	-1.463		2.181	-7.298	**	2.851
N			1833			4386			1833			4386
Groups			265			737			265			737
F-Test			F(23; 1544)			F(23; 3625)			F(23; 1544)			F(23; 3625)
			11.51			18.35			29.61			26.78
R^2 (within)			0.22			0.18			0.68			0.28
R^2 (incl.FE,adj.)			0.80			0.80			0.99			0.98
Root MSE			1.10			1.11			0.13			0.26

***, **, * = significant at 1%, 5% and 10%-levels.

Source: Own computations.

Low country risk of the partner country affects all other bilateral exports positively, but bilateral investment treaties have no effect on trade in this subset. Interestingly, however, *TREATIES* is significantly negative for intra-EU25 trade in respect of the reporting and the partner countries. This might be an indication of a substitution effect between investment and trade between countries in the

EU25 area. Rising economic freedom in the partner country is significantly associated with rising exports to that country except for intra-EU25 trade.

The annual distance variables are negative and highly significant for nearly all years when estimated for trade with non-EU25 countries. However, for intra-EU25 trade they are significantly *positive* for the period 1995-2000. This is a highly unusual result. Thus, while there has been a worldwide tendency to trade more with less distant countries, this trend was reversed within the EU25 area and relatively more trade has been directed to the periphery.

5 Conclusions

The aim of this paper is to elaborate the factors that led to the major increase in worldwide foreign direct investment during the 1990s. A further objective is to assess whether there was a differential impact of these determinants on FDI and exports. Therefore, gravity models for bilateral FDI and exports of OECD countries as reporting countries are estimated, first in a cross-section setting for 1999 and then with a panel data set over the years 1991-2001. Explanatory variables are adopted from new trade theory and the knowledge-capital approach of multinational enterprises. The results support the notion that horizontal FDI is more common than vertical FDI, since an increase in total market size proves to be a very significant promoter of FDI, while skills differences as proxied by differences in the share of the population in agriculture do not. This is consistent with Blonigen *et al.* (2002), who could not establish a relationship between skills differences and FDI either.

Some important factors can be identified that do not affect FDI and exports in the same manner. Stock market booms increased all other FDI flows, while exports were generally not influenced by stock market variations. Furthermore, changed assessment of political risk or economic freedom in a country had marked effects on exports, while they left outward FDI more or less unchanged. This result may be due to the fact that import demand is reduced in countries that are relatively unstable politically or insulated by high trade barriers, while FDI might be more affected by push factors regarding ownership advantages of multinational firms. The latter factor could not be explicitly controlled for within the

available data set. However, investment liberalisation significantly encouraged FDI, while there is some evidence to suggest that it might have reduced exports within the EU25 area.

Exchange rate fluctuations of reporting and partner countries' currencies relative to the US-dollar did have a differential influence on FDI and exports. In the case of FDI, appreciation of the dollar relative to the reporting country's currency raised outward FDI. This relationship does not directly support a relative wealth hypothesis along the lines of Froot and Stein. Rather it suggests that (US-dollar based) foreign direct investment becomes more attractive the more there is to lose by doing business in one's domestic currency. Exports, however, are raised by depreciation of the dollar relative to the partner country's currency. This is further evidence that exports are influenced more heavily by demand factors of the partner country, while FDI is driven by supply factors of the reporting country.

Price increases in the partner country raise FDI and exports in all country groups, while price increases in the reporting country lower exports significantly. They also lower all other FDI flows, but not intra-EU25 investment.

OECD countries tended to boost economic integration with neighbouring economies rather than with countries far away. Within the EU25 area, the reverse is true for exports, indicating growing trade with peripheral countries. To a lesser extent, this holds for FDI, too. After accession talks with potential new member states had become relevant, EU investment began to flow east, rendering the negative distance terms within the EU25 area insignificant. This evidence may support the view that the globalisation phenomenon is in reality ongoing regionalisation.

In summary, the results support general theories of horizontal foreign direct investment and should encourage further research in this area, especially with regard to sector-specific effects which could not be controlled for here.

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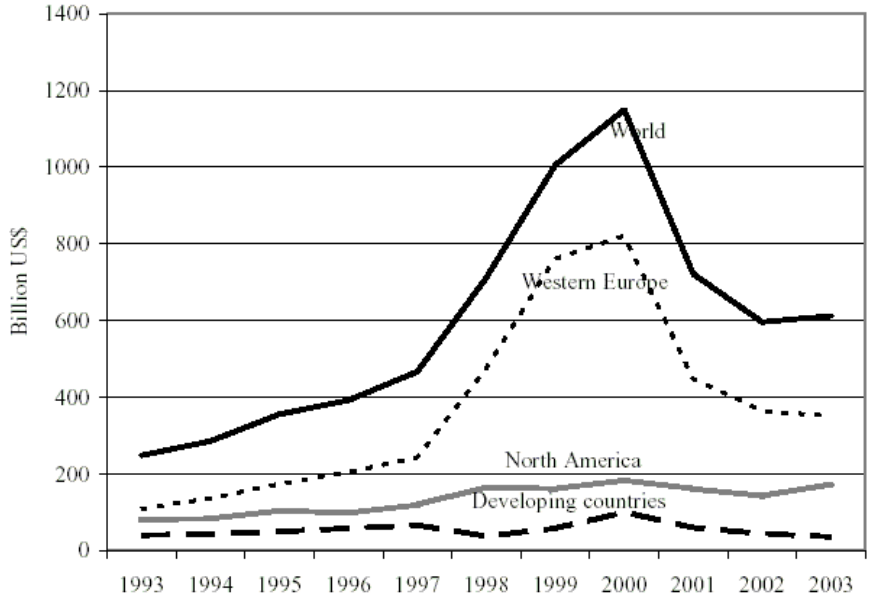
6 Appendix

Appendix 1: Development of worldwide FDI flows according to the region of origin



Source: Own presentation with data from UNCTAD.

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