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Foreign Direct Investment – Income Growth for All?[1]

by

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[1] This paper is based on a longer study prepared for the „Wissenschaftlichen Arbeitsgruppe für weltkirchliche Aufgaben der Deutschen Bischofskonferenz" [Krüger (2004)].

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Abstract

The United Nations declared halving the number of poor people by 2015 as the first of their eight Millennium Development Goals. Foreign direct investment (FDI) is often seen as one instrument towards this goal because of its ability to stimulate economic growth trickling down to the poor. Whereas many studies deal with those growth effects, little attention is paid to possible direct poverty reducing effects. Therefore, we first examine different theoretical direct and indirect ways through which FDI can affect the income of the poor. Wage effects and possible job-creating effects are considered. We find that they depend on the existing human capital and its distribution in society. Following Dollar and Kraay [2000] and Jalilian and Weiss [2001] this hypothesis is confirmed empirically with the use of cross-country regressions for a set of developing countries. In summary, this paper indicates that in developing countries with existing and equally distributed human capital FDI can help fighting poverty whereas in countries with little or very unequally distributed human capital FDI can raise poverty.

1. Introduction

Foreign direct investment (FDI) is one of the features of globalization and has received growing attention since the early 1990s. Even though global FDI flows decreased in 2003 the third year in a row, an increase of 9% could be noted for developing countries [UNCTAD (2004)]. While FDI was described particularly in the 1960's by some development theories as an important cause of underdevelopment in the developing world, today its growth effect is perceived to be positive. Seen as a motor of development in many countries, its effect on income distribution and poverty, in contrast, is often described very critically. The inequality-raising effects of FDI are seen as more than compensating the poverty-lowering growth effect.

This paper examines the effect of FDI on the income of the poor in developing countries. Following this introduction the theoretical implications are explained. In section 3 the influence of FDI on the income of the bottom income quintile is examined empirically. Special attention is given to the combined impact of FDI and the average educational level as well as of FDI and the educational equality.

2. Theoretical background

The poor can theoretically benefit from inter-country effects of capital transfers
FDI shifts capital from one country to another. This shift can have a significant effect on the distribution of income between and within countries and especially on the income of the poor. As a result of their specific functional income distribution, the effects of FDI in developing countries differ significantly from those in developed countries. In contrast to developed countries developing countries have a limited capital endowment, resulting in a high interest rate, and an abundance of labor, which leads to low wages. The usually prevailing high concentration of capital combined with high interest rates and the abundance of labor (with low wages) lead to a very unequal personal income distribution in developing countries.

According to the interest rate parity a capital flow is directed towards the highest marginal productivity of capital, assuming an identical technology parameter. Because of the limited capital endowment in developing countries capital flows from developed to developing countries are expected. Empirically, the bulk of FDI flows to developed countries, which can only be explained when the simple interest parity is augmented: The motivation for capital flows is not only based on the current interest rate differences. As indicated by the extended interest parity, short-term exchange rate expectations and risks are important as well. This explains why it could be more rational to invest in a low interest rate country, where political and exchange rate risks are lower.

Still the FDI flows to developing countries are significant, especially taking into account their economic sizes. Exploring the theoretical effects of these capital flows is therefore worthwhile. The increase of the capital availability in developing countries resulting from the capital inflows will decrease their marginal capital productivity and therefore lower the remuneration of capital, i.e. the interest rate. Furthermore, a shift from labor-intensive to capital-intensive production takes place so that the productivity of labor and its remuneration, i.e. wages, increase. Accordingly the reverse effect will be observed in developed countries. Adjustments of the marginal productivities and the corresponding remuneration of labor and capital between developing and developed countries occur. An equalizing effect of FDI on the worldwide functional income distribution and the functional income distribution within the developing countries is to be expected. As this shift benefits labor and discriminates only the

few owners of capital, the effect of capital inflows on the personal income distribution should be favorable, too.

Nevertheless the described theoretical positive effect of FDI on the personal income distribution and therefore on poverty in developing countries could not be confirmed empirically so far. A lot of empirical studies even found evidence that FDI has negative effects on income of the poor. The reason for this lies in the nature of FDI, which is not only a simple capital transfer, but a bundle of capital, human capital, know-how, and technology. FDI are therefore affecting the number of jobs, the wages paid, and the wage premium for skills.

The poor can benefit from wage effects of FDI if they hold human capital or are able to generate it

Because of its character, FDI leads to an acceleration of technical progress. Faster technical progress promotes higher growth and employment. Growth is a central prerequisite for sustained poverty reduction, and, therefore, FDI – via growth – can have a positive effect on income of the poor in an indirect way.

The strength of this effect depends not so much on the initial technology transfer itself, but on the speed of the ongoing technology upgrading, as a result of the integration of the subsidiary in the multinational enterprise [Lall (1995)]. An acceleration of technical progress goes hand in hand with more capital-intensive production processes. On the one hand, this increases the demand for human capital and, therewith, its remuneration, but on the other hand, it causes a decrease in the demand for unskilled labor and its remuneration in developing countries. This leads to a more unbalanced functional income distribution and, because of the high concentration of physical and human capital, to a more unequal personal income distribution in developing countries. Well-trained specialists will realize top salaries in comparison to unskilled workers, who earn only very low wages [Nunnenkamp/Spatz (2001)]. If the poverty-lowering contribution of the growth effect is smaller than the poverty-increasing effect of the rise in inequality, the FDI-induced technical progress is accompanied by an increase in unemployment and poverty. To summarize, the effect of FDI on the poor depends on the existing human capital and on the opportunity to gain lacking human capital. In those countries that have an equally distributed and high educational level FDI leads to a relative high and balanced increase of income, i.e. the poor will benefit from FDI in relation to their previous income share. On the other hand, countries with an unequal educational distribution have to consider that FDI leads to a more unequal income distribution, leaving uneducated people potentially worse off than before.

The poor can benefit the most from job-creating effects of FDI if it is labor-intensive

FDI affects not only the remuneration of capital and labor, but also the number of employees. This fact is of special importance for the poor, because they usually only possess their own unskilled labor and have only little or no physical capital or human capital as an alternative source of income. In developing countries the most important effect of FDI on the poor is therefore the creation or destruction of jobs [IFC (2000), p. 16].

In the short- and medium-term it must be distinguished between direct and indirect effects. The direct job-creating effect of FDI depends, above all, on the mode of entry. In case of greenfield investments, additional jobs will be created surely so that a positive effect of FDI can be observed. The effects in case of a takeover are not clear, even though there are several indications that they are negative. For example, the introduction of new production processes often contains rationalization activities, resulting in the displacement of labor. Sometimes the subsidiary is forced to reduce the production volume so that parts of the enterprise must be closed. It is also conceivable that production and employment expand through FDI [UNCTAD (1999), p. 261 and (2000), p. 182]. The decisive question whether FDI leads to job creation or destruction is the degree of labor-intensity of the production process used by the mul-

tinational corporations in the host country [Gillis et al. (1996), p. 404]. To attract relatively labor-intensive FDI, it is beneficial for developing countries to create a FDI-friendly environment and an export-oriented trading regime. Simple manufacturing activities, especially those producing for export, can create much demand for unskilled labor [UNCTAD (1999), p. 263 and UNCTAD (1994), p. 209].

The World Bank [(1995), p. 62] estimates that between 1985 and 1992 multinational enterprises created directly eight million jobs, five million of which in developing countries. New estimations talk about a direct job-creating effect between 17 and 26 million jobs by the middle of the 1990s [UNCTAD (1999), p. 264]. Although these estimations have to be interpreted very carefully, a positive, direct influence is undeniable, but the main part of the job creation is assigned to the indirect effects of FDI, which are assumed to be up to twice as high as the direct ones in the manufacturing sector [UNCTAD (1994), pp. 192]. Positive, indirect effects occur mostly in preliminary or subsequent processing stages, if the multinational enterprise is well integrated into the local market [Lall (1995), p. 524 and Tuan (1999)]. On the other hand, negative, indirect effects, like the displacement of local competitors, can occur, whereby this crucially depends on their competitiveness [Lall (1995), p. 525 and UNCTAD (1999), p. 261]. The worst case is when domestic companies with traditional labor-intensive production would be replaced by capital-intensive producing multinational enterprises so that more workers are laid of than hired [Radke (1992), p. 51 and Altvater/Mahnkopf (1996), p. 267]. Such a labor-saving effect is often strengthened by a shift of demand structures towards capital-intensively manufactured goods caused by advertisement and international demonstration effects. Even though the displacement of domestic workers could be used for an efficiency-strengthening and competition-promoting restructuring. This could lead to a stable and/or expanded employment in the future [UNCTAD (1999), p. 261].

In sum, the theoretical effects of FDI on income of the poor are unclear. However, we can notice the following conclusions:

(1) The more human capital exists and the more equally it is distributed, the more balanced are the effects of FDI on income distribution and the more benefit the poor.
(2) Job-creating effects are important.

The remaining part of this paper will focus on the first conclusion, and not include a discussion of the second one, as this would require a completely different approach.

3. Previous research

Just like in theory, existing empirical studies cannot agree on the effects of FDI on income of the poor [Aaron (2001), p. 21]. Only some older results from examinations of the effects of FDI on income inequality indicate a negative impact, while some former and recent estimations of the impact of FDI on income of the poor lead to more optimistic results.

Saltz [(1992), p. 106] focuses on the impact of FDI on the distribution of income. She uses a small set of developing countries for which the distribution of income is reported. The presence of FDI is measured by the stock of FDI per capita. Using simple regressions, she shows that FDI has a positive effect on income of the richest 20% and a negative on income of the poorest 20% in developing countries. She suggests that FDI leads to an increasing capital intensity and, thus, enhances the incomes of those who already had relatively high incomes before.

Other older estimations could not confirm these results. Weede and Tiefenbach [(1981), pp. 273 f.] look for explanations of income inequality. They test income inequality with independent variables, which refer to the level of economic development, and several country characteristics, among them dependency on foreign investment, which according to

Bornschier et al. [1978] and Bornschier and Ballmer-Cao [1979] would lead to increasing income inequality. Based on a regression analysis of data from 71 countries, Weede and Tiefenbach cannot generally confirm that FDI has a significant effect on income of the top 20% and bottom 40% of society, even though their design varies only slightly from the one of Bornschier and Ballmer-Cao.

In a new study, Bussmann, de Soysa and Oneal [2002] also assess the influence of FDI on income of the poorest 20%. They use measures for the quality of political institutions, and various aspects of the economy and society, as well as alternative measures of economic openness, e.g. the trade-to-GDP ratio and Sachs and Warner´s measure of free trade policies, and assess their influence on income of the poor. They use data of 72 countries in various years between 1970 and 1990 in a pooled cross-sectional and time-series analysis. In their estimation the FDI-coefficient is partly significant, but if further control variables are added, it becomes insignificant, thus no adverse effect of FDI on income of the poor is found.

Jalilian and Weiss [(2001), pp. 25-28] test if FDI could reduce poverty through its growth effect. They try to explore the link between FDI and income growth of the bottom quintile. A sample of 26 countries is used, and changes in poverty are examined by an equation, which relates income growth of the poor to growth of mean income and a set of additional explanatory variables, including the level of the FDI/GDP ratio. They find no general direct relationship between FDI and income growth of the poor (besides the general growth enhancing effect of FDI), only for the ASEAN countries do they find such a poverty–reducing, direct impact.

4. Model

Due to mixed empirical results gathered so far, a new test of the impact of FDI on the poor is conducted: Conclusion No. 1 on the impact of FDI and education on income of the poor is tested. The distributional effects of FDI on the global level are estimated with the help of cross-country regressions. Due to the limited quality of macroeconomic data from developing countries, such regressions have to be interpreted very carefully.

The structure of the regressions follows those of Dollar and Kraay [(2000), p. 15], though they did not deal with the role of FDI, and those of Jalilian and Weiss [2001], who included FDI.

The basis is the following log-linear relationship:

$$\ln y_{ct}^{P} = e_0 + e_1 \cdot \ln y_{ct} + e_2 ' X_{ct} + \mu_c + \varepsilon_{ct} .$$

The indices c and t represent the respective country and the year of the observation. lny is the logarithm of GDP. The superscript P refers to the GDP of the poorest 20%. X is a vector of control variables and $\mu_c + \varepsilon_{ct}$ stand for the error term.

For our examinations the differences of successive observations are formed. Written in growth rates the following equation will be used below; whereas g stands for the growth rate of GDP and Δ for the change of the variable in the regarded period:

$$g_{ct}^{P} = f_1 \cdot g_{ct} + f_2 ' \Delta X_{ct} + \Delta \varepsilon_{ct} .$$

To investigate what kind of influence FDI, especially in combination with the average education level and equality of education, may have on income of the poor, four sets of regressions are performed. Following the first set of basic regressions this exercise will be repeated including regional, income and export focus dummy variables. The relevant data set contains 72 observations for 31 countries lying between 1975 and 1999. This limited number of observations is largely due to constraints in data availability, especially for the changes in the Gini coefficient. Income growth of the poorest 20% is chosen as dependent variable. In comparison to the quoted studies the following contains a larger sample of independent variables:

- Average per capita income growth (GDPPCG):
  Average per capita income growth is the most important explanatory variable of income growth of the poor. But only if the poor benefit from growth more than the rich, growth will lead to a more equal income distribution in developing countries.
- The average ratio of inflowing FDI over GDP in % (FDIFAV):
  Although it is empirically not confirmed, a negative effect of FDI on income growth of the poorest 20% is expected.
- Change of the Gini coefficient (GINIC):
  A reduction of the Gini coefficient should be good for the poor. A change towards a more balanced income distribution is most probably associated with income of the poorest 20% overproportially.
- National per capita income in comparison to the US (CGDPreltoUS):
  This catch-up variable shows the influence of economic backwardness. Based on the absolute convergence hypothesis countries with low per capita income levels should grow faster than high-income countries. Therefore, a positive impact of the catch-up variable is expected.
- Openness of a country (TRADEAV):
  According to trade theory, an increase in trade leads to a more equal income distribution. This finding is confirmed empirically, but it is not robust in all studies. Assuming that rich people benefit from trade above average, it is possible that increasing trade volumes lead to a decrease of income to the poorest 20%, which was also confirmed empirically. Thus, the effect is not clear.
- Average education (EDUAV):
  The higher the average educational level, the more human capital the poor hold and the higher are the wages they will earn. Thus, a rise in average education has a positive effect on income of the poorest 20%.
- Educational equality (EDUGINI):
  An equal educational distribution means that the opportunities for income generation by the poor increase. In turn educational equality leads to a more equal distribution of human capital, which is confirmed empirically.

5. Results

Table 1 shows the results of our basic analysis. The significant findings are:

(1) The poorest 20% do not benefit less than average from economic growth.
Our results support the view that growth reduces poverty. In all estimations the coefficient of average per capita income growth is positive and highly significant. T-tests do not show significant variations from 1. This indicates that the income of the bottom quintile rises as strong as that of the total population.

(2) If the income distribution gets more equal, income of the poorest 20% is affected positively.
All estimations show that an increasing Gini coefficient affects the average income of the poorest 20% negatively.

Independent Variable	1.1 coefficient (p-value)	1.2	1.3	1.4	1.5
GDPPCG	0,9224*	0,9273*	0,9262*	0,9207*	0,9281*
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
FDIFAV	0,0068	0,012	0,0066	0,0068	0,0061
	(0,429)	(0,341)	(0,446)	(0,431)	(0,486)
GINIC	-0,0418*	-0,0419*	-0,0418*	-0,0418*	-0,0418*
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
CGDPreltoUS	-0,0011	-0,0010	-0,0010	-0,0011	-0,0009
	(0,371)	(0,398)	(0,466)	(0,381)	(0,477)
TRADEAV		-0,0002			
		(0,569)			
EDUAV			-0,002		-0,0126
			(0,826)		(0,496)
EDUGINI				0,0113	0,1250
				(0,901)	(0,512)
Observations	72	72	72	72	72
F-Test	122,335*	96,951*	96,488*	96,433*	79,792*
Corr. R^2	0,872	0,871	0,871	0,870	0,869

Table 1: Determinants of per capita income growth of the poorest 20% (part1).

For all other variables no significant results are found. Even the variables of average education and the educational Gini are not significant and are also strongly correlated. To refine the examination of the effects of FDI in combination with average education and educational equality, new estimations are calculated, which contain the following interaction variables in addition to the already known variables:

- FDIEDU, the product of FDIFAV and EDUAV, and
- FDIEDUGINI, the product of FDIFAV and EDUGINI.

Although the interaction variables are strongly correlated with FDIFAV, the following results from table 2 can be summarized:

(1) The poorest 20% benefit the more from FDI, the better the populations average education level is and the more equal education is distributed within the population.
FDIEDU shows only a significant result, if EDUAV is also an explanatory variable. FDIEDU is then positive and significant at the 10% level. FDIEDUGINI shows significant positive results no matter if EDUGINI is included in the equation or not. The smaller p-value and thus, the higher level of significance for FDIEDUGINI, in comparison to FDIEDU, leads to the indication, that this relationship is stronger. It has to be considered, though, that FDIFAV in estimations 2.1 and 2.4 does not show an acceptable level of significance. This also applies to EDUAV and EDUGINI in the estimations 2.4 up to 2.6, in which interaction variables involving education aspects are included. Altogether it can be noted that the hypothesis derived from theory can be confirmed.

(2) An equal educational distribution is not only necessary for positive effects of FDI, but also to prevent income of the poorest 20% from negative effects of FDI.
For those estimations that contain FDIEDUGINI, FDIFAV shows significant negative results. This negative impact of FDI alone is only compensated by the positive impact of FDI in combination with educational equality.

Independent variable	2.1 coefficient (p-value)	2.2	2.3	2.4	2.5	2.6
GDPPCG	0,8951*	0,9040*	0,8940*	0,9044*	0,9124*	0,9104*
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
FDIFAV	-0,0615	-0,0745***	-0,0516***	-0,0842	-0,0885**	-0,0664**
	(0,205)	(0,069)	(0,074)	(0,121)	(0,050)	(0,039)
GINIC	-0,0418*	-0,0416*	-0,0416*	-0,0419*	-0,0416*	-0,0416*
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
CGDPreltoUS	-0,0017	-0,0019	-0,0020	-0,0014	-0,0016	-0,0016
	(0,181)	(0,132)	(0,105)	(0,302)	(0,200)	(0,222)
EDUAV				-0,0092		-0,0170
				(0,345)		(0,346)
EDUGINI					-0,0754	0,0679
					(0,438)	(0,714)
FDIEDU	0,0141			0,0186***		
	(0,153)			(0,091)		
FDIEDUGINI		0,1563**			0,1829**	
		(0,043)			(0,032)	
Observations	72	72	72	72	72	72
F-Test	99,870*	103,462*	104,068*	83,256*	85,808*	74,126*
Corr. R^2	0,874	0,878	0,879	0,874	0,878	0,878

Table 2: Determinants of the per capita income growth of the poorest 20% (part 2).

Estimations with regional variables

In the previous estimations a significant positive influence of FDI in combination with the average level and the equality of education on income of the poorest 20% was found. Based on this, the following regressions analyze whether regional differences can be found. Therefore, the following country groups are formed, according to World Bank classifications:

- Latin America and the Caribbean (LA),
- East Asia and Pacific (AS),
- Sub-Sahara-Africa (SSA), and
- South Asia (SOUTHA),

whereby the reference group consists of the remaining countries from the region Middle East and North Africa, as well as Turkey. The estimation equation contains the already known variables and in addition interaction variables for the effects of FDI in combination with average education and educational equality by region. The results are presented in table 3.

The basic results relating to growth of average GDP (GDPPCG) as well as the Gini coefficient can be confirmed. Furthermore relating to the regional effect of FDI new conclusions can be drawn.

(1) In combination with average education FDI has a positive influence on income of the poorest 20% in all regions.

Estimation 3.1 shows that there is a positive influence of the interaction variable of FDI and average education (FDIEDU) on income of the poorest 20%. It seems that the influence of the interaction variables is the same in all regions, because the interaction variables of FDIEDU with regional dummies do not show significant results. But the introduction of an additional variable for average education (EDUAV) in estimation 3.1a shows a significant negative result for the region East Asia and Pacific. Thus, the common influence of FDI and average education is smaller in the East Asia and Pacific region, but it is still positive.

(2) In combination with an equal distribution of education, FDI always has a positive effect on income of the poorest 20%, but its strength varies by country group.

The interaction variable for FDI and educational equality (FDIEDUGINI) shows only positive values for the reference group, while all the coefficients for the regional interac-

tion variables are negative and significant. Therefore, the effect of FDI and educational equality on income of the poorest 20% is stronger in the countries of the reference group than in the others, but it is positive everywhere. The smallest influence is found in South Asia.

	3.1	3.1a	3.2	3.2a
Independent Variable				
GDPPCG	0,9111*	0,9360*	0,8767*	0,8865*
	(0,000)	(0,000)	(0,000)	(0,000)
FDIFAV	-0,1059***	-0,1498**	-0,2018*	-0,2207*
	(0,085)	(0,036)	(0,004)	(0,003)
GINIC	-0,0412*	-0,0412*	-0,0408*	-0,0408*
	(0,000)	(0,000)	(0,000)	(0,000)
CGDPreltoUS	-0,0026***	-0,002	-0,0024***	-0,0021
	(0,066)	(0,176)	(0,064)	(0,132)
EDUAV		-0,0132		
		(0,219)		
EDUGINI				-0,076589
				(0,442)
FDIEDU	0,0397***	0,0518**		
	(0,053)	(0,023)		
LAFDIEDU	-0,0130	-0,0161		
	(0,249)	(0,163)		
ASFDIEDU	-0,0174	-0,0211***		
	(0,134)	(0,078)		
SSAFDIEDU	-0,0191	-0,0190		
	(0,124)	(0,124)		
SOUTHAFDIEDU	-0,0252	-0,0242		
	(0,201)	(0,216)		
FDIEDUGINI			0,6911*	0,7332*
			(0,003)	(0,002)
LAFDIEDUGINI			-0,3374**	-0,3477**
			(0,015)	(0,013)
ASFDIEDUGINI			0,875**	0,876**
			(0,021)	(0,019)
SSAFDIEDUGINI			-0,3499*	-0,3484*
			(0,008)	(0,009)
SOUTHAFDIEDUGINI			-0,4179**	-0,4009**
			(0,034)	(0,044)
Observations			72	72
F-Test			61,886*	55,397*
Corr. R^2			0,885	0,885

Table 3: Determinants of per capita income growth of the poorest 20% by regional country groups.

Estimations with income variables

Because the effects of FDI on income of the bottom quintile may not only be influenced by regional differences, but also by level of economic development, it is necessary to analyze differences resulting from different income levels. For this reason the following country groups are differentiated, according to World Bank classifications:

- Low income countries (LOW),
- Middle income countries - lower category (LOWMID),
- Middle income countries - upper category, and
- High income countries (HIGH),

whereby the middle income countries - upper category are chosen as reference group. Besides the known variables like average income growth (GDPPCG), average FDI inflows (FDIFAV), change of the Gini coefficient (GINIC), and the catch-up variable (CGDPreltoUS) the following variables are included in the estimation equation as well:

- income-specific dummy variables,
- income-specific variables of the influence of FDI,

- income-specific variables of the influence of FDI and average education, and
- income-specific variables of the influence of FDI and educational equality.

The results are summarized in table 4.

	4.1	4.1a	4.2	4.2a	4.3	4.3a	4.4	4.4a
Independent Variables	Coefficient (p-Value)							
GDPPCG	0,954*	0,9743*	0,9073*	0,9437*	0,9313*	0,9335*	0,8957*	0,9160*
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
FDIFAV	-0,1109	-0,1816	-0,0737	-0,1453**	-0,0381	-0,0402	-0,0882	-0,1227**
	(0,347)	(0,172)	(0,161)	(0,027)	(0,815)	(0,808)	(0,108)	(0,049)
GINIC	-0,0407*	-0,0413*	-0,0416*	-0,042*	-0,041*	-0,0411*	-0,0419*	-0,0422*
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
CGDPreltoUS	0,0007	0,0011	-0,0019	-0,0006	0,0004	0,0004	-0,0018	-0,0010
	(0,705)	(0,583)	(0,188)	(0,692)	(0,853)	(0,842)	(0,203)	(0,513)
EDUAV		-0,0162		-0,0208**				
		(0,243)		(0,068)				
EDUGINI						-0,0188		-0,1315
						(0,896)		(0,233)
LOW	0,08423	0,0556			0,071	0,0672		
	(0,102)	(0,325)			(0,243)	(0,321)		
LOWMID	0,0282	0,0274			0,012	0,0122		
	(0,571)	(0,580)			(0,834)	(0,833)		
HIGH	-8,184**	-8,3105**			0,2715	0,2729		
	(0,026)	(0,024)			(0,538)	(0,540)		
LOWFDI	0,1958	0,1515			0,1042	0,0967		
	(0,424)	(0,540)			(0,712)	(0,739)		
LOWMIDFDI	0,0482	0,0666			-0,0257	-0,0295		
	(0,719)	(0,620)			(0,885)	(0,871)		
HIGHFDI	7,1732**	7,3546**			-0,6728	-0,6735		
	(0,028)	(0,025)			(0,107)	(0,110)		
FDIEDU	0,0269	0,0411	0,0199***	0,0343**				
	(0,262)	(0,127)	(0,073)	(0,012)				
LOWFDIEDU	-0,0557	-0,036	-0,0033	0,0033				
	(0,363)	(0,569)	(0,714)	(0,735)				
LOWMIDFDIEDU	-0,0024	-0,0042	0,0038	0,0092				
	(0,934)	(0,883)	(0,554)	(0,190)				
HIGHFDIEDU	-1,1932**	-1,2259**	-0,0044	-0,0053***				
	(0,028)	(0,024)	(0,172)	(0,097)				
FDIEDUGINI					0,0914	0,0951	0,1745**	0,2306**
					(0,717)	(0,711)	(0,049)	(0,022)
LOWFDIEDUGINI					-0,2715	-0,252	-0,0273	0,0018
					(0,603)	(0,646)	(0,690)	(0,980)
LOW-MIDFDIEDUGINI					0,1365	0,1448	0,0596	0,0940
					(0,642)	(0,632)	(0,318)	(0,157)
HIGHFDIEDUGINI					1,2323***	1,2335***	0,010513	0,017624
					(0,084)	(0,086)	(0,757)	(0,608)
Observations	72	72	72	72	72	72	72	72
F-Test	38,047*	35,849*	63,054*	58,604*	37,202*	34,124*	63,734*	57,218*
Corr. R^2	0,880	0,880	0,875	0,880	0,877	0,875	0,876	0,877

Table 4: Determinants of per capita income growth of the poorest 20% by income groups.

The estimations with income-differentiated country groups confirm the basic results: Growth of average per capita income (GDPPCG), as well as reductions in the Gini coefficient (GINIC) have significant positive effects on income growth of the bottom quintile. In reference to the common effects of FDI and average or equally distributed education, different results occur for different income country groups. The results especially for high-income countries have to be judged very carefully, as they are only based on three observations from Singapore.

(1) The common effects of FDI and average education on per capita income growth of the poorest 20% are smaller in the high-income country Singapore than in the other income groups.

Taking into account the income differentiated effects of FDI and income differentiated dummy variables, the estimations 4.1 and 4.1a show that the high income country Singapore is characterized by a more positive effect of FDI, in general, but a lower growth of

income of the poorest 20%, in comparison to the remaining income differentiated country groups. If regional dummies and regionally differentiated impacts of FDI are omitted, a positive and significant effect of FDI and average education (FDIEDU) on income of the poorest 20% in all income country groups is found (estimation 4.2). With inclusion of the variable for average education (EDUAV), estimation 4.2a shows that this effect is smaller in high-income countries than in other income categories.

(2) The influence of FDI and equally distributed education on income of the poorest 20% is positive for all income country groups, but it is strongest for high-income countries.

The estimations, which go along with the common effects of FDI and educational equality, show positive effects of this interaction variables (FDIEDUGINI) for all groups, if dummy variables for certain income groups, as well as for income differentiated effects of FDI, are not considered (estimation 4.4 and 4.4a); however, if those variables are taken into account, clearly more positive effects of FDI and educational equality arise for high income countries than for the other country groups, for which these variables remain insignificant (estimation 4.3 and 4.3a).

Estimations with export variables

The question whether industry orientation of a country affects the influence of FDI on income of the poorest 20% is of interest, as different industries offer different opportunities for income generation. In order to analyze this question, the previous estimations will be repeated for the following country groups, which are formed with respect to their export focus, i.e. 50% of their exports falling under one category.

- Manufacturing (MANU),
- Primary goods (NONFUEL),
- Fuels (FUEL), and
- Services (SERVICE),

whereby countries with a differentiated export structure are used as reference group.

The summarized results are displayed in table 5.

The basic results of the previous investigations, regarding the independent variables average per capita income growth (GDPPCG) and Gini coefficient (GINIC), can be confirmed by the regressions, which included country groups differentiated by export goods focus. Besides this, the catch-up variable (CGDPreltoUS) is usually negative and significant; so that the smaller the backwardness in comparison to the US, the smaller is growth of per capita income of the poorest 20%. The following results can be reported:

(1) High average education is of particular importance for fuel exporting countries.

Based on estimation 5.1 and 5.1a, where FUELFDI is negative and significant and FUEL-FDIDU is positive and significant, the generally negative effect of FDI on income of the poorest 20% can be overcompensated by the positive effects of the interaction of FDI in combination with average education in fuel exporting countries. In addition, a weakly significant negative influence of FDI on income of the poorest 20% can be determined for those countries, which export primary goods (without fuel) in particular. In this case the strong correlation between NONFUELFDI and NONFUELFDIEDU is probably responsible for the missing significant positive effect of FDI in combination with high average education (NONFUELFDIEDU).

	5.1	5.1a	5.2	5.2a	5.3	5.3a	5.4	5.4a
Independent variables	Coefficient (p-value)							
GDPPCG	0,9251*	0,9351*	0,8909*	0,9285*	0,8590*	0,8657*	0,8807*	0,9040*
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
FDIFAV	0,0162	-0,0017	-0,0729	-0,1196***	0,0057	-0,0078	-0,0794	-0,1143***
	(0,794)	(0,982)	(0,154)	(0,057)	(0,929)	(0,918)	(0,158)	(0,090)
GINIC	-0,0406*	-0,0407*	-0,0413*	-0,0414*	-0,04*	-0,0401*	-0,0414*	-0,04147*
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
CGDPreltoUS	-0,0053*	-0,0049**	-0,0023	-0,0014	-0,0042**	-0,0040***	-0,0021	-0,0015
	(0,003)	(0,019)	(0,104)	(0,368)	(0,015)	(0,052)	(0,125)	(0,333)
EDUAV		-0,0057		-0,0154				
		(0,674)		(0,198)				
EDUGINI						-0,0440		-0,1162
						(0,741)		(0,339)
MANU	0,0114	0,0221			0,0162	0,0228		
	(0,839)	(0,721)			(0,771)	(0,702)		
NONFUEL	-0,0005	0,0036			0,0010	0,0039		
	(0,994)	(0,954)			(0,986)	(0,947)		
FUEL	0,0671	0,0614			0,1969***	0,1947***		
	(0,483)	(0,529)			(0,071)	(0,077)		
SERVICE	-0,0654	-0,0555			-0,0117	-0,0070		
	(0,513)	(0,592)			(0,889)	(0,935)		
MANUFDI	-0,2309	-0,2271			-0,4729***	-0,4713***		
	(0,325)	(0,337)			(0,055)	(0,058)		
NONFUELFDI	-0,2169***	-0,2137***			-0,3249**	-0,3233**		
	(0,053)	(0,059)			(0,025)	(0,027)		
FUELFDI	-1,7791**	-1,7523**			0,6238	0,6816		
	(0,030)	(0,034)			(0,498)	(0,471)		
SERVICEFDI	-0,228	-0,2329			0,2808	0,2649		
	(0,730)	(0,726)			(0,348)	(0,386)		
FDIEDU	0,0048	0,0096	0,0195***	0,0317**				
	(0,725)	(0,590)	(0,094)	(0,036)				
MANUFDIEDU	0,0402	0,0377	-0,004	-0,0073				
	(0,375)	(0,413)	(0,424)	(0,192)				
NONFUEL-FDIEDU	0,0444	0,0439	-0,0041	-0,0019				
	(0,110)	(0,117)	(0,606)	(0,820)				
FUELFDIEDU	0,36**	0,3532**	0,0013	-0,0019				
	(0,031)	(0,036)	(0,820)	(0,751)				
SERVICEFDIEDU	0,0668	0,0666	-0,0055	-0,0024				
	(0,705)	(0,708)	(0,690)	(0,864)				
FDIEDUGINI					0,0519	0,0856	0,1860***	0,27***
					(0,676)	(0,597)	(0,098)	(0,060)
MANU-FDIEDUGINI					0,8866***	0,8733***	-0,0159	-0,0344
					(0,064)	(0,071)	(0,722)	(0,481)
NONFUEL-FDIEDUGINI					0,5604***	0,5557***	-0,0561	-0,0519
					(0,052)	(0,057)	(0,395)	(0,432)
FUEL-FDIEDUGINI					-0,9849	-1,085	-0,0235	-0,0536
					(0,485)	(0,456)	(0,641)	(0,367)
SERVICE-FDIEDUGINI					-0,6838	-0,6520	-0,0594	-0,0404
					(0,350)	(0,381)	(0,642)	(0,755)
Observations	72	72	72	72	72	72	72	72
F-Test	33,216*	30,904*	54,769*	50,013*	33,130*	30,780*	54,885*	49,434*
Corr. R^2	0,885	0,883	0,872	0,873	0,885	0,883	0,872	0,872

Table 5:   Determinants of the per capita income growth of the poorest 20% by export emphasis differentiated country groups.

(2) FDI, in combination with equally distributed education, has a particularly positive effect in countries, which have an export focus on primary goods (without fuel) or on manufactured goods.
FDI shows significant negative effects on per capita income growth of the poorest 20% in estimation 5.3 and 5.3a, not only in primary goods exporting countries, but also in countries whose export focus is on manufactured goods. But positive effects exist in both country groups, as well, because the interaction variables between FDI and educational equality are both weakly significant positive. No special effects result for fuel exporting countries and countries with an export focus on services. If the dummy variables for the different export groups and the export differentiated effects of FDI are neglected, like it happened in estimation 5.4 and 5.4a, then a significant positive relationship for the interaction of FDI and educational equality (FDIEDUGINI) can be observed in all country groups.

6. Conclusion

FDI often increases poverty in developing countries instead of reducing it. The intention of this paper was to prove or disprove this thesis.

In the theoretical analysis a clear direction of the effect of FDI on income growth of the poorest 20% was not discovered. FDI can work poverty-reducing through accelerated growth and its associated trickle-down effect, but it can also work poverty-increasing, if this positive effect gets more than equaled out by the effects resulting from the decreasing importance of unskilled labor and the rising meaning of human capital reinforced by FDI.

With the help of cross-section analysis, it was then found that high economic growth is a solid strategy to poverty reduction, since the poorest 20% benefit as much from growth as the rest of the population. It could also be stated that a more equal income distribution has a positive effect on income of the poorest 20%.

Due to the introduction of interaction variables between average education and FDI, as well as educational equality and FDI, the formulated hypothesis could be confirmed: The more human capital exists and the more equally it is distributed, the more beneficial are the effects of FDI on income of the poorest 20%. This applies to all country groups, no matter by which criterion the country groups were formed.

Moreover, the regressions with a regional emphasis indicate that the effects of FDI, in combination with average education, are only smaller in the East Asia and Pacific region than in the reference group. For the estimations with differentiated income country groups, some interesting results, especially for the high-income country Singapore, arise, even though they have to be interpreted very carefully. Compared with the remaining groups, the positive influence of FDI, in combination with average education, is smaller and the positive effect of FDI and educational equality is larger in the high-income country Singapore. Furthermore, it could be stated that in fuel exporting countries high average education has a special importance for the effect of FDI on income of the bottom quintile. Concerning equally distributed education; the most positive effects of FDI are seen in countries exporting primary goods (without fuel) and manufactured goods.

In summary, this paper concludes that the effects of FDI cannot be judge independently from other variables. Whether FDI is an investment in poverty or out of poverty depends, first of all, on average education and the distribution of education within the population. Therefore, accompanying educational measures have to go along with FDI to assure that the whole population and especially the poor will benefit. This is even more important as not only the positive effects of FDI depend on the available human capital. To prevent the poor from the potentially negative effects of FDI, a minimum level of average education and a certain degree of educational equality is needed.

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