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FDI, Regulations and Growth

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May 2005

Preliminary and Incomplete:
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Abstract

The paper explores the linkage between income growth rates and Foreign Direct Investment (FDI) inflows. So far the evidence is rather mixed, as no robust relationship between FDI and growth has been established. We argue that countries need a sound business environment in the form of good government regulations to be able to benefit from FDI. Using a comprehensive dataset for regulations and standard cross-sectional regression analysis, we test this hypothesis and find evidence that excessive regulations restrict growth through FDI only in the most regulated economies. This result holds true for different specifications of the econometric model, including instrumental variable regressions.

JEL Classification: C31, F21, F43, L51
Key Words: FDI, Regulations, Growth

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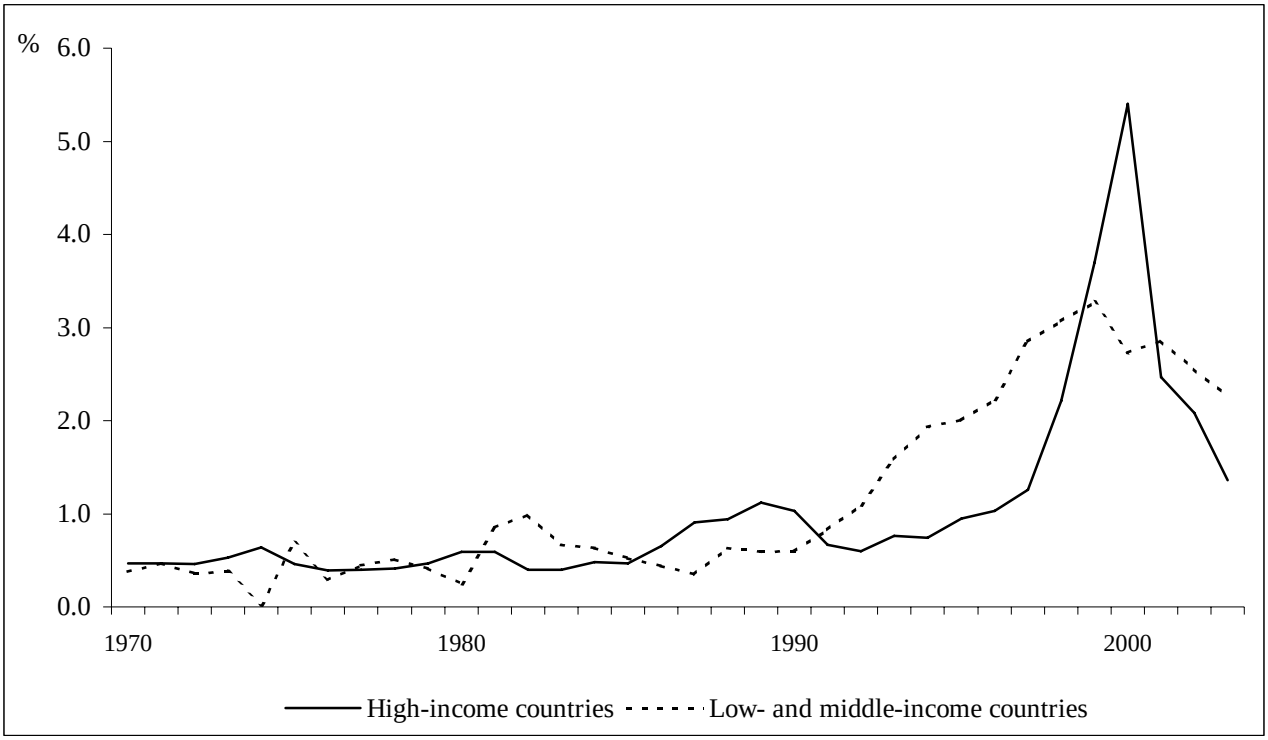
1. Introduction

The enormous increase in foreign direct investment (FDI) flows across countries is one of the clearest signs of the globalisation of the world economy over the past 20 years. Total FDI flows increased from some US $55 billion in 1985 to US $1,511 billion before falling back to US $573 billion in 2003 (World Bank 2005a). Even as a share of Gross Domestic Product (GDP), we do observe an enormous increase in the relevance of FDI. In high-income countries, this share increased from some 0.5 to 1.0 per cent in the 1980s to more than 5 per cent in 2000 and then declined to 1.4 per cent in 2003 (Figure 1). While the increase in FDI inflows was less drastic in low- and middle-income countries, the percentage of FDI in GDP remained at more than 2 per cent after the year 2000, indicating a slightly higher relevance of FDI flows in developing countries in the most recent period.

Figure 1: Foreign Direct Investment Inflows as a Share of GDP, 1970-2003



Source: World Bank (2005a).

Over the last couple of decades, the theoretical literature on the impact of foreign investment flows on host economies has identified several channels for FDI to influence per capita income

growth rates. As a start, FDI may provide new capital, allowing additional investment in both human and physical capital, which can be very beneficial for (developing) countries with liquidity constraints.[1] In contrast to short-term capital flows, long-term foreign investment is much more likely to be valuable to host economies, in particular if the investment takes the form of new or expanding production plants.

Moreover, foreign investment inflows are generally accepted as a means to incorporate new knowledge from abroad. The theory of the multinational firm proposes that multinational corporations have a technological advantage over local firms that outweighs the cost of doing business in external markets (Caves 1996, Markusen 2002). The inflow of new knowledge may benefit domestic firms through imitation and learning (Findlay 1978, Mansfield and Romeo 1980, Blomström 1986), increasing competition in local markets, facilitating human capital mobility among firms (Fosfuri et al. 2001, Glass and Saggi 2002) and vertical linkages (Rodríguez-Clare 1996, Markusen and Venables 1999), thereby increasing the productivity level and sustaining a higher growth rate.

Despite the fact that the economic benefits of increasing FDI inflows are well established in the theoretical literature, the evidence on technology spillovers is far from conclusive in both firm-level and country-level data.[2] For example, Aitken and Harrison (1999) could not establish any evidence of a positive technology spillover from multinationals to domestic firms in Venezuela in the 1980s. On the other hand, Görg and Hijzen (2004) find that imitation and learning can take place when local firms are geographically close to multinationals and have enough absorptive capacity. Using firm-level data for Lithuania, Javorcik (2004) discovers that spillovers may occur through backward linkages between multinationals and their local suppliers. Another finding is that labour turnover might act as an important channel. As multinationals train the workforce in their operations abroad to use new technologies, technology diffusion might also occur due to a labour turnover from multinationals to domestic firms or if locals establish their own business (Djankov and Hoekman 2000).

[1] Much of the earlier literature has emphasised differences in capital abundance and returns on capital as the main driving force for capital flows across countries. See Caves (1996) for a literature survey.
[2] Görg and Greenaway (2004) survey the empirical literature on multinationals and productivity spillovers.

Unlike most of the microeconomic evidence, studies using aggregated FDI data found questionable support that FDI in itself significantly boosts growth rates in all recipient countries. In a cross-sectional regression framework, Ram and Zhang (2002) find some evidence that FDI is boosting host economies' income growth rates, based on data for the 1990s. Yet they note that the results are not robust to all their model specifications. UNCTAD (1999), on the other hand, fails to find a clear linkage between FDI and growth rates, as the sign of the coefficient for FDI is either positive or negative depending on the variables that enter the regressions. In a similar approach, Dutt (1997) also falls short of detecting any empirical linkage between foreign investment and per capita growth rates.[3]

Nonetheless, using a panel of data for the 1970-1999 period for 84 countries, Li and Liu (2005) establish a clear linkage between FDI and growth rates. They confirm this outcome for different econometric techniques, including a simultaneous equation system. In contrast, Carkovic and Levine (2005) also use a panel setting and control for simultaneity bias, but do not find robust results for positive growth effects of FDI inflows in their sample of 72 countries for the 1960-1995 period. They note that this outcome (and the inconclusive evidence in the literature in general) might be due to the specific empirical approaches and the different time periods used.

Apart from data and methodological issues, a few studies have tried to find further reasons for the inconclusive evidence. Based on their results, Balasubramanyam et al. (1996) note that FDI might promote growth only in export-promoting rather than in import-substituting countries and that, thus, openness to trade is essential for the growth effects of foreign investment. Borensztein et al. (1998) find that certain characteristics in the host countries may play an important role. More specifically, they discover that countries need a particular educational attainment level to benefit from FDI. Borensztein et al. argue that to be able to benefit from positive (technological) spillover effects, host economies have to have the educational capacity to incorporate these effects.

[3] De Mello (1997) and Lim (2001) provide surveys of the literature.

More recently, a series of papers have been published that examined the linkages between the effectiveness and regulations of financial markets, FDI and growth. In essence, Hermes and Lensink (2003), Durham (2004) and Alfaro et al. (2004) all find that countries with better financial systems and financial market regulations can exploit FDI more efficiently and achieve a higher growth rate. These studies argue that countries need not only a sound banking system, but also a functioning financial market to allow entrepreneurs to obtain credit to start a new business or expand an existing one. In this way, countries are able to benefit from inward investment to achieve a higher growth rate.

Aside from financial market regulations, the impact of broader government regulations on the interaction between FDI and growth has not been analysed so far. Our paper intends to fill this gap, as we explore the linkages between government regulations, FDI and economic growth in a comprehensive manner. It can be argued that countries may only benefit from foreign investment inflows if they have appropriate local government regulations and institutions in place. Excessive regulations are likely to restrict growth through FDI if human and capital resources are prevented from reallocation. For example, if starting and closing down a business are hindered by extensive and costly government regulations, involving many bureaucratic procedures requiring entrepreneurs' time and resources, capital flows are prevented from being reallocated to the most productive sectors.

Likewise, if restrictive employment laws for hiring and firing of employees cause a lower labour market turnover, technology spillovers to domestic firms are less likely to occur. A similar argument can be made for other forms of government regulations, such as protecting (foreign and domestic) investors by ensuring creditor rights and enforcement of contracts. Both are difficult tasks involving high uncertainty, considerable time and extraordinary expenses. Hence, multinationals would reduce forward and backward linkages with the local economy, thereby affecting the likelihood of horizontal or vertical spillovers taking place. In summary, restrictive government regulations may prevent productivity increases related to the exploitation of technology spillovers from foreign direct investment inflows.

Against this backdrop, we will use a broad range of government regulations, employing the extensive Doing Business database on government regulations, provided by the World Bank (2004), and test our hypothesis that countries with restrictive regulations cannot exploit FDI inflows efficiently. The World Bank database has the main advantage of focusing on relatively consistent and objective data in measuring regulations across countries. More explicitly, the effects of starting and closing down a business, labour market regulations, enforcing contracts, creditor rights and obtaining credit are examined. These forms of regulations are likely to affect the reallocation of resources and, consequently, the positive effects of FDI inflows in an economy.

Overall, we find that FDI does not stimulate growth in economies with excessive business and labour regulations, after controlling for some other relevant determinants of observed changes in GDP growth rates. However, this outcome is restricted to the top 20 or 25 per cent most regulated countries, indicating that there is a threshold level for which our results do hold up. This outcome has some powerful policy implications, as governments have first to improve the regulatory quality in their countries to be able to benefit from increased openness to foreign capital in the form of direct investment.

The paper is structured as follows: The next section describes the data and variables used, whereas Section 3 presents the specification of the econometric model and the results. As a start, we use OLS cross-section regression analysis to estimate the impact of policy-related variables on per capita growth rates. Since a number of the independent variables are likely to be endogenous, we will also employ an instrumental variable approach. Finally, Section 4 summarises the main results and concludes with some policy implications.

2. Data and Variables

The analysis comprises a sample of 82 developing and developed countries. Included are those countries for which data on the dependent and all independent variables incorporated in the

regressions are obtainable.[4] As the dependent variable, we use annual average real GDP per capita growth rates for the period 1975 to 2003 (the variable is labelled *GROWTH*). Taking annual average growth rates over almost 30 years enables us to focus on medium- to long-term growth rates and to exclude short-term (business cycle) fluctuations.

As the explanatory variables in the cross-country growth regressions, we closely follow the literature on the determinants of income growth rates and employ the following variables:[5]

- initial income per capita (*GDP1975*) to control for differences in GDP levels before the considered period
- black market premium for foreign currency (US Dollar) in per cent (*BMP*)
- changes in consumer prices (*INFLATION*)
- FDI inflows (*FDI*), measured as annual average of net FDI inflows as a share of GDP
- average years of secondary education in adult population (*EDUCATION*), representing human capital levels
- openness to trade (*TRADE*), computed as imports and exports divided by GDP
- population growth (*POPGROWTH*) in per cent
- government consumption (*GOVCONSUM*), calculated as total government consumption as a share of GDP

Except otherwise noted, each independent variable relates to (annual) averages for the period from 1975 to 2003, the same time interval as income growth rates. Based on economic theory, we would expect that the first three variables are negatively associated with income growth rates, whereas for *FDI*, *EDUCATION*, and *TRADE* we would assume a positive linkage. For *POPGROWTH* the sign is undetermined, as a fast-growing population might indicate a booming economy that attracts migrants from abroad or a least-developed country that has been trapped in a cycle of high-population growth and negative per-capita growth rates. For the last explanatory

[4] See Appendix C for the country sample.
[5] Barro and Sala-i-Martin (1995) and Sala-i-Martin (1997) provide a literature review and a sensitivity analysis of a large number of variables associated with economic growth. Data sources for all variables are provided in Appendix A.

variable, *GOVCONSUM*, we would expect a positive linkage with *GROWTH*, if higher government expenditures were targeted at, for instance, education. On the other hand, *GOVCONSUM* might negatively affect per capita income growth rates if there is a crowding out of private sector activities.

Based on data for January 2003, we compile an aggregated regulation index using five sub-components, namely, starting a business, labour market regulations, contract regulations, creditor rights and insolvency regulations, drawn from the World Bank Doing Business database (World Bank 2004). The starting-a-business indicator is the (arithmetic) mean of the average number of procedures to start a business, the number of days and the costs required to complete that process,[6] while the labour market regulation index is an average of three indexes: flexibility of hiring, conditions of employment and flexibility of firing. The contract regulation index is an average of three indexes covering the number of judicial procedures to enforce a contract, the duration and the cost, whereas the creditor rights index measures four powers of secured creditors in bankruptcy. Finally, for the insolvency index we use the goals of insolvency index from the Doing Business dataset that reflect the difficulties in closing down a business.

In general, the World Bank database on regulations is widely recognised (and used) as a high-quality measure of regulations across countries.[7] Whereas most other indicators in this field rely on expert surveys or other perception-based surveys, the Doing Business indicators employs factual information to measure differences in regulations along several dimensions (see paragraph above). This methodology allows us to obtain information on regulatory outcomes, such as time and money spent on bureaucratic procedures, and thus to investigate the efficiency of the government institutions in place. By focusing on evidence for regulations, we obtain more objective indicators that are less influenced by stages of economic development or recent events.[8]

[6] Before taking the average for this indicator, all three sub-components are rescaled to 0-1 by dividing all observations by the highest figure in each of the three sub-components.
[7] Bolaky and Freund (2004) and Pica and Mora (2005) have used the Doing Business indicators, for instance.
[8] For an extended discussion of the advantages of the Doing Business indicators, see World Bank (2004).

To get an overall index of regulations (*REGULATION*) we compute a weighted average of the five individual components of regulations, taking factor loadings in principal components analysis as weights.[9] Higher values for all five sub-components (and, thus, for *REGULATION*) reflect more regulations, that is, regulations with a lower quality for business operations. For our country sample, the combined indicator ranges from -4.13 to -0.40, with a mean of -2.09 and a standard deviation of 0.85.[10]

Similar to the quality of institutions, it has been pointed out in numerous studies that regulatory quality is an important determinant of overall income levels.[11] It is therefore not surprising that *REGULATION* is strongly (negatively) correlated with income per capita levels (Table 1). Similarly, the regulation indicator is also negatively associated with GDP per capita growth rates, indicating that stricter regulations are associated with lower GDP growth rates, though the correlation coefficient is smaller in comparison to GDP per capita. *REGULATION* is also negatively correlated with *FDI*, though the coefficient is even lower (-0.30).

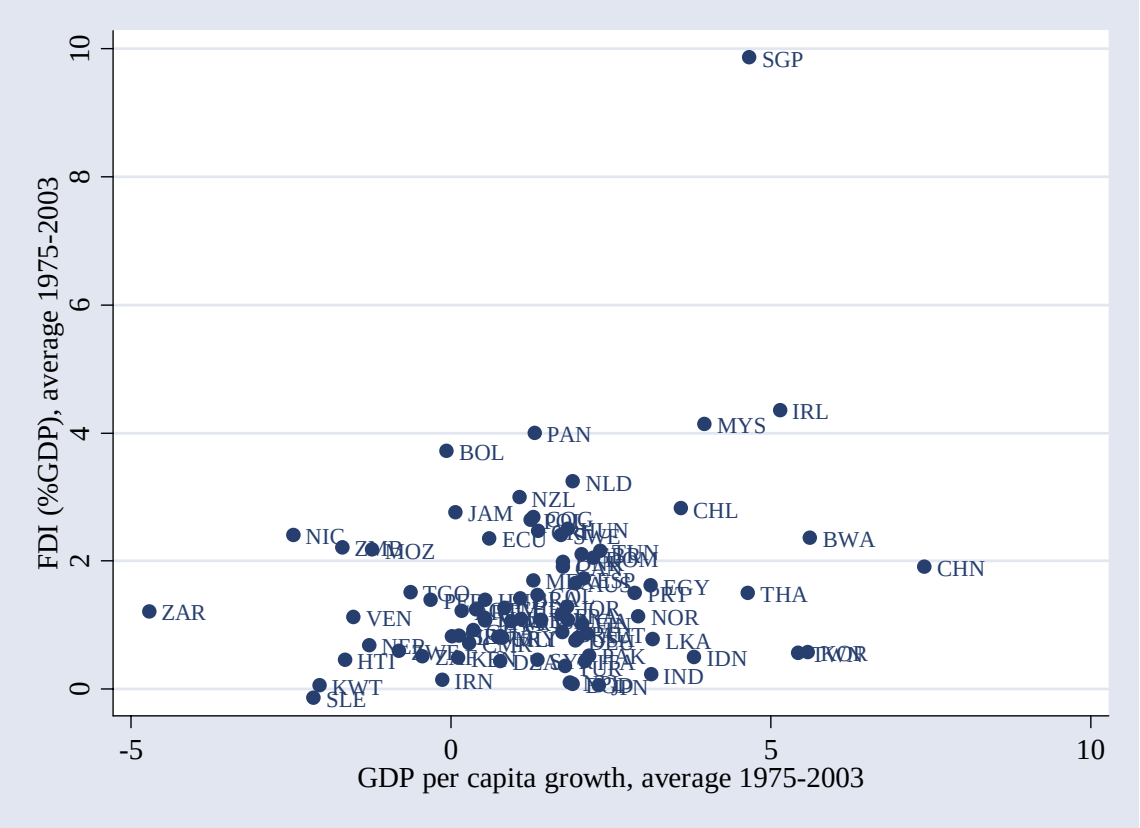
Table 1: Correlation Matrix

Variable	REGULATION	GDP2003	GROWTH	FDI
REGULATION	1.00			
GDP2003	-0.75	1.00		
GROWTH	-0.39	0.37	1.00	
FDI	-0.30	0.19	0.24	1.00

In our country sample, FDI inflows are not that closely associated with GDP growth rates, as the correlation coefficient is relatively low (0.24). This outcome becomes even clearer, if we look at the partial scatter plot of both variables (Figure 2). In general, no close linkage between FDI and GROWTH can be established, even if we exclude the clear outlier Singapore, which has very high FDI inflows. Yet a simple correlation or a graph cannot establish a linkage between variables, since we have other determinants of economic growth to take into account.

[9] Before combining the five regulation indicators, we have taken the logarithm of each of them. This procedure yields negative values for *REGULATION* for all countries.
[10] Descriptive statistics for all variables are reported in Appendix B.
[11] See, for example, Acemoglu et al. (2001), Dollar and Kraay (2002) and Rodrik et al. (2004).

Figure 2: FDI Inflows and GDP Growth Rates, Average 1975-2003



3. Model Specification and Empirical Results

To control for other determinants of economic growth, we estimate first the following empirical model:

$$GROWTH_i = ß_0 + ß_1\, FDI_i + ß_2\, REGIONAL\ DUMMY_i + \gamma_i\, CONTROL\ VARIABLES_i + e_i \quad (1)$$

where β_i and γ_i are the coefficients to be estimated and e_i is an error term. As control variables we consider the above mentioned eight indicators that can be expected to explain variations in GDP growth rates across countries. Following the World Bank's definition of regions, we also add regional dummies (sub-Saharan Africa, South Asia, East Asia & the Pacific, Middle East & North Africa, Latin America & the Caribbean, Europe and Central Asia, North America, and

Western Europe) to control for regional characteristics. However, since only the dummies for sub-Saharan Africa and East Asia and the Pacific were significant, we added both of them but excluded all other regional dummies.

The results are presented in Table 2. We start with a benchmark regression, reported in column 1, including only initial income and human capital levels, government expenditures and population growth. In comparison to other empirical studies on the determinants of economic growth, the overall fit of the regression is reasonable, as the R-squared is at 0.4 (and will improve further if more explanatory variables are added). The signs of the coefficients are as expected for initial income per capita and human capital levels. While the coefficient for government consumption is not significant, we obtain a negative and highly significant coefficient for population growth, implying that a strong increase in the number of inhabitants is associated with a significant reduction in income (per capita) growth rates.

Next, we add foreign direct investment and obtain a positive coefficient that is significant at the 1 per cent level. From this perspective, the analysis of our country sample in the specific period shows a positive linkage between FDI and growth. In a further regression, we include regional dummies for both sub-Saharan African and East Asian and Pacific countries to control for regional characteristics in the growth regression (column 3). Not surprisingly, the East Asia and the Pacific dummy is positive (and highly significant), while the opposite sign can be observed for the sub-Saharan Africa dummy. When we add further control variables, such as the inflation rate, the black-market premium for foreign currency and openness to trade, the relationship between FDI and growth becomes less clear, as FDI is at times significant and other times not. We then run hundreds of additional regressions, including variations of the control variables as well as additional or different independent variables, but nonetheless, we obtain a very similar picture. In effect, these first results nicely underlines the inconclusive evidence in the previous literature. Whether a significant linkage between foreign investment inflows and income growth can be established partly depends on the choice of the control variables.[12]

[12] Of course, the statistical significance of the FDI coefficient may depend also on the country sample and the period considered, as FDI can fluctuate considerably from country to country and from period to period (see Figure 1).

Table 2: FDI and Growth (OLS)

	Dependent Variable: GROWTH				
Independent Variables	(1)	(2)	(3)	(4)	(5)
Constant	14.18***	14.03***	14.72***	14.06***	15.11***
	(5.99)	(6.12)	(7.66)	(5.14)	(6.79)
FDI		0.32***	0.19	0.34**	0.20
		(2.65)	(1.42)	(2.18)	(1.33)
log GDP1975	-1.72***	-1.73***	-1.77***	-1.51***	-1.63***
	(5.61)	(5.66)	(7.29)	(4.90)	(6.65)
log EDUCATION	3.40***	3.27***	2.27***	2.75***	1.76**
	(4.71)	(4.53)	(3.02)	(3.49)	(2.11)
GOVCONSUM	0.02	0.02	0.06	0.01	0.05
	(0.49)	(0.37)	(1.34)	(0.14)	(1.03)
POPGROWTH	-0.93***	-0.96***	-0.91***	-0.85***	-0.81***
	(3.78)	(4.32)	(4.77)	(3.86)	(4.18)
EAST ASIA & PACIFIC			1.21**		0.90*
			(2.32)		(1.66)
SUB-SAHARAN AFRICA			-1.42***		-1.57***
			(2.82)		(3.27)
log TRADE				-0.10	-0.02
				(0.20)	(0.05)
log BMP				0.02	-0.05
				(0.13)	(0.50)
log INFLATION				-0.42**	-0.33**
				(2.10)	(2.03)
R^2	0.40	0.45	0.55	0.50	0.59
Observations	82	82	82	82	82

Notes: Absolute t-values, which have been corrected for heteroskedasticity, are reported in parentheses; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

In view of these results, we extended the growth regressions to include *REGULATION* and an interactive term (*FDI*REGULATION*), to test whether regulations across countries matter for the linkage between FDI and growth rates. However, in none of the regressions do we get a significant coefficient for the interactive term (results not reported).[13] Likewise, we run regressions in all different specifications, such as *REGULATION* in quadratic form, but do not get any significant results.

Regarding the intensity of regulations, it could be expected that regulations hinder countries from taking advantage of higher FDI inflows, but this might apply only for countries with relatively restrictive regulations. To check this hypothesis, we split the sample of countries using a

[13] For these regressions, we use an inverse regulation index, that is, we multiply *REGULATION* with (-1), to ensure a straightforward interpretation of the results.

threshold for the top 20 per cent most regulated economies.[14] More specifically, using the regulation index we construct a dummy variable (*REGULATION DUMMY*) that takes the value 1 for the top 20 per cent most regulated economies and zero otherwise. We then compute an interactive term of the regulation dummy and FDI to see whether regulations in the most regulated countries matter. The new specification of the model is as follows:

$$GROWTH_i = ß_0 + ß_1 FDI_i + ß_2 FDI_i{*}REGULATION\ DUMMY_i + ß_3 REGULATION_i + ß_4 REGIONAL\ DUMMY_i + \gamma_i CONTROL\ VARIABLES_i + e_i \quad (2)$$

We do not include both the regulations dummy and the regulation index, as we would encounter severe multicollinearity in the regression analysis. The OLS estimation results for the top 20 per cent most regulated economies are shown in Table 3. Again, we start with the same set of control variables as before, but add FDI and the regulations index (column 1). Both *FDI* and *REGULATION* are significant and the latter has the expected negative sign, meaning that more restrictive regulations are associated with lower income per capita growth rates.

We then add the interactive term of FDI and the regulation dummy and obtain a negative and highly significant coefficient (column 2). Importantly, the coefficient for the interactive term is considerably larger than the one for FDI. For the 20 per cent most regulated countries this outcome implies that the net impact of foreign investment inflows is negative, as an increase in FDI as a share of GDP by 1 percentage point is associated with a decrease in the per capita growth rates of -0.21 percentage points (+0.36-0.57). When we add further control variables (columns 3 to 5), both the sign and size of the coefficient for the interactive term do not change much. Even though the significance level drops to the 5 or 10 per cent level, we still get relatively robust results for the interactive term. The difference between the coefficients for FDI and the interactive term declines (and finally, vanishes), however, as we add more explanatory variables to the regressions.[15]

[14] We later change the threshold to test the robustness of our results.

The regulation index is no longer significant if the interactive term with the regulation dummy is included, mainly because the interactive term captures more of the variations in per capita growth rates than the index alone. Interestingly, as we add the regulation index and the interactive term, the coefficient for FDI remains always positive and significant. This result is further evidence for the fact that the linkage between FDI and growth depends also on the choice of the control variables.

Table 3: Top 20 Per Cent Most Regulated Economies (OLS)

	Dependent Variable: GROWTH				
Independent Variables	(1)	(2)	(3)	(4)	(5)
Constant	12.49***	13.12***	13.58***	14.43***	15.01***
	(5.18)	(5.56)	(7.71)	(4.69)	(6.69)
FDI	0.26**	0.36**	0.24**	0.46**	0.32**
	(2.42)	(3.85)	(2.52)	(2.32)	(2.01)
REGULATION	-0.49*	-0.15	-0.20	0.05	-0.07
	(1.72)	(0.50)	(0.69)	(0.17)	(0.22)
FDI*REGULATION DUMMY		-0.57***	-0.39*	-0.47**	-0.31*
		(2.69)	(1.91)	(2.19)	(1.64)
log GDP1975	-1.56***	-1.59***	-1.61***	-1.39***	-1.46***
	(5.00)	(5.44)	(7.53)	(4.76)	(7.09)
log EDUCATION	2.67***	3.01***	1.59**	2.53***	1.03
	(3.02)	(3.61)	(2.22)	(2.75)	(1.37)
GOVCONSUM	-0.02	-0.02	-0.05	-0.01	0.05
	(0.36)	(0.40)	(0.98)	(0.14)	(1.07)
POPGROWTH	-0.84***	-0.80***	-0.78***	-0.72***	-0.69***
	(3.61)	(3.71)	(4.40)	(3.43)	(3.91)
EAST ASIA & PACIFIC			1.31***		1.13**
			(2.63)		(2.13)
SUB-SAHARAN AFRICA			-1.67***		-1.77***
			(3.30)		(3.83)
log TRADE				-0.36	-0.29
				(0.62)	(0.67)
log BMP				-0.02	-0.08
				(0.14)	(0.89)
log INFLATION				-0.41*	-0.34**
				(1.88)	(2.08)
F-value for joint test on FDI and FDI*REGULATION DUMMY		8.77***	3.75**	3.97**	2.39*
R^2	0.45	0.48	0.60	0.64	0.64
Observations	82	82	82	82	82

Notes: See Table 2; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

[15] We test the joint significance of FDI with the interaction term, using an appropriate *F* test. The hypothesis that both coefficients are jointly zero cannot be rejected at the 1, 5 or 10 per cent level, depending on the specification of

It might be argued that some of the independent variables are in fact endogenous, implying that the magnitude of the estimated coefficients might be biased. For example, FDI may not only lead to higher growth rates, but growing markets might attract multinational corporations. The growth (and size) of a particular market is likely to be an indication of its level of attractiveness to the investment, in the case that the multinational corporation aims to produce for the local market (horizontal or market-seeking FDI), thereby boosting growth rates of the host country (Chakrabarti 2001, Busse 2004).

Likewise, whereas regulations are very likely to affect growth rates, since administrative barriers or labour market regulations may prevent the optimal allocation of labour and capital in an economy, it can also be argued that growth affects regulations. Above all, growing economies may face better conditions to introduce high-quality institutions that, in turn, boost GDP growth rates. Finally, omitted factors may affect both the growth rate and the FDI inflows, which again could lead to biased estimates for the coefficients.

To deal with the problem of endogeneity, we use two stage least squares (2SLS) instrumental variable regressions. As an appropriate instrument for FDI in the considered period 1975 to 2003, we use the lagged level of FDI in the period 1970 to 1974 (*FDI7074*). Starting with the contribution by Wheeler and Moody (1992), strong evidence has emerged in the literature to suggest that past FDI stocks are in effect a powerful determinant of present or future investment decisions by multinational corporations.[16] Multinationals are much more likely to be attracted by countries that already have considerable FDI inflows. Firms' own experiences in host countries and the success of other multinationals serve as a strong attraction for further foreign investments.

For the regulation index, we also follow the previous literature and instrument it with the legal origin, the location and linguistic background of a country. There is evidence that the legal origin and, partly related to that, the share of people able to speak English or another major European

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the model (see Table 3).

language are still major determinants of the current institutional setting and regulatory quality of a country (Hall and Jones 1999). Along these lines, Acemoglu et al. (2001) find that settler mortality rates of European settlers a couple of hundreds of years ago still are a highly significant determinant of the present institutional quality in a country and use this variable as an instrument. Unfortunately, using settler mortality would severely reduce the number of countries included in the regressions, which could bias the results. As a consequence, we do not use settler mortality rates but concentrate on the following instruments for *REGULATION*:

- the fraction of the population that speaks English (*ENGFRACT*)
- the fraction of the population that is proficient in English and/or another major European language (*EURFRACT*)
- the legal origin of a country, that is, dummies for British, French, German, Socialist and Scandinavian legal origin (*LEGALBRITISH*, *LEGALFRENCH*, etc.) and
- the distance from the equator (*DISTANCE*)

The results of the instrumental variable regressions for the top 20 per cent most regulated countries are reported in Table 4. We start with the above-mentioned instruments, but instrument only for the interactive term (*FDI*REGULATION DUMMY*) and *REGULATION*. As can be seen from columns 1 to 4, FDI's interaction with the regulation dummy continues to have a negative coefficient in all four different specifications, with all of them significantly different from zero. On the other hand, the coefficients for *REGULATIONS* are now positive, but significant only in one out of four model specifications. This non-robust outcome is in line with our OLS regression results.

[16] See also the empirical studies by Borensztein et al. (1998), Gastanaga et al. (1998) and Jensen (2003), who all find that a lagged FDI variable has a highly significant coefficient in their regressions, even though they use very different specifications.

Table 4: Top 20 Per Cent Most Regulated Economies (2SLS)

	Dependent Variable: GROWTH							
Independent Variables	(1)[1]	(2)[1]	(3)[1]	(4)[1]	(5)[2]	(6)[2]	(7)[2]	(8)[2]
Constant	14.95***	14.99***	17.42***	17.49***	14.20***	14.73***	12.79***	13.31***
	(5.65)	(6.05)	(4.97)	(5.42)	(6.14)	(6.12)	(4.08)	(4.95)
FDI	0.63***	0.50**	0.79***	0.64***	0.19	0.18	0.14	0.04
	(3.01)	(2.51)	(3.08)	(2.62)	(0.94)	(0.85)	(0.54)	(0.20)
REGULATION	0.86	0.62	1.01*	0.73	0.36	0.45	0.41	0.03
	(1.39)	(1.06)	(1.70)	(1.26)	(0.82)	(0.85)	(0.94)	(0.08)
FDI*REGULATION	-2.00**	-1.80**	-2.01**	-1.87**	-0.87**	-1.54**	-0.74*	-0.50
DUMMY	(2.14)	(2.09)	(2.17)	(2.20)	(2.06)	(1.97)	(1.78)	(1.37)
log GDP1975	-1.67***	-1.67***	-1.53***	-1.58***	-1.64***	-1.63***	-1.44***	-1.48***
	(5.21)	(5.51)	(4.65)	(5.04)	(5.70)	(5.51)	(5.00)	(5.76)
log EDUCATION	4.02***	2.65**	3.61***	2.22**	3.73***	2.48**	3.08***	1.22
	(3.87)	(2.48)	(3.33)	(1.96)	(4.16)	(2.43)	(3.42)	(1.44)
GOVCONSUM	0.02	0.03	0.001	0.04	0.01	0.04	0.02	0.04
	(0.42)	(0.64)	(0.01)	(0.83)	(0.14)	(0.85)	(0.46)	(0.97)
POPGROWTH	-0.74**	-0.70***	-0.62**	-0.58**	-0.80***	-0.68***	-0.79***	-0.73***
	(2.49)	(2.60)	(2.08)	(2.13)	(3.10)	(2.57)	(3.10)	(3.32)
EAST ASIA &		1.07*		0.91		1.34**		1.24**
PACIFIC		(1.76)		(1.49)		(2.23)		(2.50)
SUB-SAHARAN		-1.37**		-1.45**		-1.49***		-1.82***
AFRICA		(2.42)		(2.50)		(2.74)		(3.86)
log TRADE			-0.67	-0.56			0.37	0.30
			(1.15)	(1.04)			(0.58)	(0.56)
log BMP			-0.04	-0.10			-0.04	-0.10
			(0.31)	(0.75)			(0.31)	(0.89)
log INFLATION			-0.31	-0.22			-0.30	-0.22
			(1.30)	(0.99)			(1.41)	(1.16)
Shea partial R^2 (first-stage)								
FDI					0.48	0.41	0.46	0.49
REGULATION	0.39	0.38	0.44	0.42	0.60	0.44	0.64	0.62
FDI*REGULATION DUMMY	0.11	0.11	0.11	0.12	0.46	0.13	0.45	0.45
Hansen-Sargan overiden-tification test (χ^2 p-value)	3.43 (0.75)	4.12 (0.66)	3.22 (0.78)	3.80 (0.70)	5.40 (0.72)	4.34 (0.74)	7.23 (0.51)	10.90 (0.21)
R^2	0.30	0.43	0.33	0.45	0.43	0.46	0.48	0.62
Observations	82	82	82	82	82	82	82	82

Notes: Absolute z-values are reported in parentheses; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

[1] Instrumented variables: REGULATION and FDI*REGULATION; instruments: FDI7074, ENGFRAC, EURFRAC, DISTANCE, LEGALBRITISH, LEGALFRENCH, LEGALGERMAN, LEGALSOCIALIST, and included exogenous variables (LEGALSCANDINAVIAN excluded).

[2] Instrumented variables: FDI, REGULATION and FDI*REGULATION; instruments: FDI7074, FDI7074*REGULATION DUMMY, ENGFRAC, EURFRAC, DISTANCE, LEGALBRITISH, LEGALFRENCH, LEGALGERMAN, LEGALSOCIALIST (LEGALSCANDINAVIAN excluded), interactive terms of legal origin and FDI, and included exogenous variables.

We assess the validity of the instruments using the standard Hansen-Sargan test for overidentifying restrictions. Our instrumental variable (IV) regressions are based on the

assumption that the instruments are uncorrelated with the error term in the growth equation. The results for the *J*-test and the p-value for each IV specification are reported in Table 4. We cannot reject the null hypothesis that the instruments are uncorrelated with the error term in all four specifications. This result means that our instruments, that is, the legal origin, geographical and language variables, are affecting growth but only through the level of regulation and the interaction of the FDI and regulation index variables.

Another important issue with IV estimation is to test for the instrument relevance. Since we are using more instruments than endogenous variables we do not know if the instruments collectively capture the independent variation in the right-hand-side variables. One way to assess this issue is to take a closer look at the magnitude of the R^2 in the first stage for each endogenous variable. The Shea first stage R^2 shows that the partial R^2 for *REGULATION* is around 40 per cent in all four model specifications, which is relatively good. Of more concern are the comparatively low figures for the interactive term, which might be an indicator that the choice of our instruments is not suitable for the interaction term. However, when there are two endogenous variables the overall fit in the first stage may provide confusing information about the instrument relevance. This is particularly the case if there is a high correlation among instruments, that is, merely one exogenous variable is explaining most of the R^2 in the first stage in each of the two endogenous variables. Yet all p-values for the interactive term are below 0.10 and Shea's partial R^2 are above 10 per cent. This means that all instruments are relevant in Shea's sense and thus, the instruments have sufficient relevance for the right-hand side variables in the growth regression.

Next, we instrument for FDI in addition to the other two variables. Also, we expand the number of instruments by adding FDI's interaction with the regulation dummy and the interaction of the legal origin with FDI to the IV regressions. The results, presented in columns 5 to 8, are very similar. The interactive term still has a negative sign and is significant in three out of four model specifications and slightly misses the 10 per cent significance level in the fourth one (p-value 0.16). Now, the values for Shea's first stage R^2 are above 0.40 for all instrumented variables and specifications but one single case (interactive term in column 6), which shows that the instruments are relevant (all p-values are below 0.01 with the one exception). In contrast to the

OLS regressions, the size of the coefficient for the interactive term is considerably larger than the one for FDI in all eight specifications, which strengthens the results that the most regulated countries would not observe any positive growth effects from FDI inflows. Based on our results, the opposite outcome can be expected.

In another set of regressions, we repeat the exercise for the top 25, 33 and 40 per cent most regulated economies. These further tests are useful to ascertain whether the particular threshold level chosen for the regulation dummy drives the results. In comparison to the top 20 per cent most regulated countries, the basic outcome is roughly similar if we set the cut-off point at the top quarter most regulated economies (Table 5). The interactive term is statistically significant in three out of four OLS regressions and in six out of eight IV regressions. Yet the number of significant results declines considerably if we increase the threshold level to top 33 or 40 per cent most regulated countries. These results mean that there is a particular threshold level, which is highly relevant for our results. In other words: Low quality regulations do not allow the top fifth or top quarter most regulated economies to take advantage of FDI inflows.

Table 5: Robustness Checks Using Different Threshold Levels for the Regulation Dummy

	Number of regressions where interactive term FDI*REGULATION DUMMY is significant[1]	
Percentage of most regulated countries for the cut-off point of the regulation dummy	OLS regressions (4 basic regressions)	IV (2SLS) regressions (8 basic regressions)
Top 20 per cent	4/4 (4 out of 4)	7/8 (7 out of 8)
Top 25 per cent	3/4	6/8
Top 33 per cent	1/4	3/8
Top 40 per cent	0/4	2/8

Note: [1] 10 per cent significance level or better.

It might be argued that the results are driven by the set-up of the regulation dummy that is in turn based on the regulation index. Hence, we have used the five underlying regulation sub-components rather than the aggregated indicator to test whether our basic findings change and to identify the sub-components that are driving the results. Out of the five sub-components, starting-a-business shows by far the strongest results. In comparison to the aggregated regulation index, the significance levels for the new interactive term, where the dummy is based on

regulations on starting a business only, are even higher for the top 20 and top 25 most regulated countries.[17] But even for this sub-component, the outcome is very similar if we select a higher threshold for the dummy, as significance levels of the interactive term drop considerably for the top third most regulated countries.

Likewise, we obtain relatively strong results for regulations on employment and closing down a business, even though they are not as significant as those for starting-a-business. For the remaining two sub-components, the results are considerably weaker. Nevertheless, we think that the overall level of regulations in a country, affecting the reallocation of factor endowments, has several important contributing components that are difficult to disentangle and that the overall level of regulations matters most.

4. Concluding Remarks

In comparison to less regulated countries, our results indicate that more regulated economies are less able to take advantage of the presence of multinational companies. This result is further evidence of the fact that important host country characteristics can lead to a positive impact of foreign investment inflows on growth rates. While Borensztein et al. (1998) have singled out educational attainment levels and Hermes and Lensink (2003), Durham (2004) and Alfaro et al. (2004) the importance of financial markets, our empirical results support the view that regulations are another fundamental determinant of the beneficial effects of FDI reaped in host economies.

All these results have important policy implications. However, our results do not provide evidence that regulations across *all* countries (included in our sample) matter, but rather that they restrict growth through foreign investment inflows only in the most regulated economies. Any attempts by government to attract capital in the form of foreign direct investment by offering special tax breaks are not likely to yield the expected beneficial effects if the regulatory quality is rather low. In addition to increasing educational attainment levels and boosting the regulatory

[17] Results are not shown due to space constraints. They are available upon request.

quality and liquidity of financial markets, host countries have to reform their fundamental framework for regulations to enhance chances that FDI inflows can contribute to higher growth rates. Thus, our research results are basically in line with those stressing the need for an adequate institutional framework for trade liberalisation and economic integration to be successful. According to the findings of some recent studies (Dollar and Kraay 2002, Rodrik et al. 2004, and Bolaky and Freund 2004), international trade stimulates growth only in economies with better institutions and less excessive business and labour regulations. Our results lead us to conclude that regulations affect the interaction of FDI and growth rates in a very similar way. To achieve positive welfare effects of FDI inflows, governments first have to tackle the institutional setting and regulatory framework in their countries.

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Appendix A: Definition of Variables and Data Sources

Variable	Definition	Source
GROWTH	Real growth of Gross Domestic Product per capita in per cent, annual average 1975-2003	World Bank (2005a)
FDI	Foreign direct investment, net inflows in per cent of GDP, annual average 1975-2003	UNCTAD (2005)
FDI7074	Foreign direct investment, net inflows in per cent of GDP, annual average 1970-1974	UNCTAD (2005)
REGULATION	Composite regulation index for business regulations, labour market regulations, contract regulations, creditor rights and insolvency regulations, January 2003	World Bank (2004)
REGULATION DUMMY	Composite regulation dummy for the 20/30 per cent most regulated countries in the sample, 0 and 1, January 2003	
GDP1975	Gross Domestic Product per capita, in constant (1995) international US dollars (PPP), 1975	World Bank (2005a)
EDUCATION	Years of secondary education in adult population, average 1975-1995	Barro and Lee (2000)
GOVCONSUM	Government consumption divided by GDP, average 1975-2002	World Bank (2005a)
POPGROWTH	Population growth, annual average 1975-2002	World Bank (2005a)
TRADE	Total imports and exports divided by Gross Domestic Product, average 1975-2002	World Bank (2005a)
BMP	Black market premium (BMP) for foreign currency (US Dollar) in per cent, calculated as log(1+BMP average 1975-1999)	World Bank (2005b)
INFLATION	Change in consumer prices (CPI),computed as log(1+CPI average inflation), annual average 1975-2003	World Bank (2005a)
DISTANCE	Distance from the equator, measured as absolute value of latitude of capital city	Dollar and Kraay (2002)
ENGFRACT	Fraction of the population speaking English, per cent	Dollar and Kraay (2002)
EURFRACT	Fraction of the population speaking a major European Language, per cent	Dollar and Kraay (2002)
LEGAL	Five legal origin dummies: British, French, German, Scandinavian and Socialist, 0 and 1	World Bank (2004)
REGIONAL DUMMY	Set of regional dummy variables: (1) Sub-Saharan Africa, (2) South Asia, (3) East Asia & the Pacific, (4) Middle East & North Africa, (5) Latin America & the Caribbean, (6) Europe and Central Asia, (7) North America, (8) Western Europe	World Bank (2005a) classification

Appendix B: Descriptive Statistics of the Main Variables

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
GROWTH	82	1.38	1.98	-4.71	7.41
log GDP1975	82	8.22	1.05	6.16	10.16
FDI	82	1.51	1.36	-0.14	9.86
log EDUCATION	82	0.79	0.43	0.07	1.71
GOVCONSUM	82	15.09	5.41	6.14	33.00
POPGROWTH	82	1.81	0.97	-0.13	3.89
REGULATION	82	-2.09	0.85	-4.13	-0.40
log TRADE	82	4.01	0.49	2.82	5.88
log BMP	82	2.38	1.96	-0.14	8.03
log INFLATION	82	2.75	1.29	1.20	7.10

Appendix C: Country Sample

Algeria, Argentina, Australia, Austria, Bangladesh, Benin, *Bolivia*, Botswana, *Brazil*, Cameroon, Canada, Chile, China, *Colombia*, *Democratic Republic of Congo*, *Republic of Congo*, Costa Rica, Denmark, *Dominican Republic*, *Ecuador*, Egypt, *El Salvador*, Finland, France, Germany, Ghana, Greece, *Guatemala*, *Haiti*, Honduras, Hungary, India, *Indonesia*, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Republic of Korea, Kuwait, Malawi, Malaysia, Mali, Mexico, *Mozambique*, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Norway, Pakistan, Panama, *Paraguay*, Peru, Philippines, Poland, Portugal, Senegal, *Sierra Leone*, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syrian Arab Republic, Taiwan, Thailand, *Togo*, Tunisia, Turkey, Uganda, United Kingdom, United States, Uruguay, *Venezuela*, Zambia, Zimbabwe

Note: Countries highlighted in italics belong to the group of the 20 per cent most regulated countries.