The FDI-growth nexus in Latin America: the role of source countries and local conditions*

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September 19, 2008

Abstract

Foreign Direct Investment (FDI) has surged in Latin America (LA) since the mid 1990s. European and North American FDI is of capital importance. We investigate the FDI-growth nexus in LA allowing for different source countries, regional heterogeneity, interaction terms with FDI, and more than 20 growth determinants. We use Bayesian Model Averaging to address model uncertainty and to select the best models and most robust parameters. The principal finding is that a positive FDI-growth nexus in LA requires a functioning legal framework and macroeconomic stability. We also find that European FDI is only indirectly correlated with productivity growth, whereas North American FDI is more robust and thus directly correlated with productivity growth.

JEL Classification: C52, F21, F43, O54
Keywords: FDI-growth nexus, model uncertainty, Bayesian Model Averaging, Latin America

*We are indebted to Harald Badinger, Jan Boone, Katie Carman, Matteo Ciccarelli, Ron Davies, Steven Durlauf, Jan Magnus, Enrique Moral-Benito, Jan Mutl, Owen Powell, Dean Williamson, and Maurizio Zanardi for constructive comments. Moreover, we thank seminar participants at Tilburg University and conference attendants at ETSG 2006, SMYE 2007, VfS "Development Economics" 2007, ESEM 2007, and FIW "International Economics". Previous running title: "Does it make a difference? Comparing growth effects of European and North American FDI in Latin America".

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1 Introduction

Latin American (LA) countries adopted outward-looking development policies in response to the severe debt crises of the 1980s. Since then, they have considered the attraction of foreign direct investment (FDI) as a key strategy to promote growth and development. At the end of the 1990s, FDI accounted for more than 80% of the net private capital flows into the region (Levy Yegati et al. 2007). FDI from North America (NA) and Western Europe (EUR) is of capital importance culminating in 70-80% of the stocks in the large LA countries.[1] Recently, EUR has become the largest direct investor in South America, ahead of NA (UNCTAD 2004; Vodusek 2004). Consequently, several questions arise: To what extent can FDI flows into LA contribute to growth? Which conditions must be met for FDI to be beneficial for growth? Are growth effects different when source countries differ; in particular, does it make a difference whether FDI comes from EUR or NA?

The theoretical literature proposes many arguments for FDI having a positive impact on growth.[2] First, FDI is considered to act as the main channel for international technology transfers. It increases the productivity of the host country through direct and indirect effects: productivity effects in the recipient firm and productivity spillovers to upstream and downstream industries. Second, foreign firms are supposed to increase competition thus inducing local firms to become more productive. Third, foreign firms are assumed to invest in training of the work force thereby improving qualifications in the country.

There are relatively few studies that analyze the FDI-growth nexus for LA. On a macroeconomic level, De Gregorio (1992) investigates growth determinants for the period 1950-85. He finds that FDI inflows are a significant determinant for GDP per capita growth, having a 3–6 times higher impact than regular investments. Bengoa and Sanchez-Robles (2003) examine the relationship between economic freedom, FDI, and per capita growth in a panel for the period 1970-99. They also find a significant positive impact. Performing Granger causality tests between FDI and output growth for the period 1975-97 for the three main FDI recipients, Cuadros et al. (2004) confirm a positive FDI-growth nexus in Mexico but not in Argentina and Brazil. Moreover, there are a few studies investigating direct productivity and spillover effects of FDI on the firm level in LA (Blomström and Wolff 1994; Aitken and Harrison 1999; Kugler 2006.)

Two major drawbacks are related to these empirical studies. First, it is not possible to derive clear conclusions and robust policy implications due to the use of varying econometric methods, model specifications, country samples, and time spans. Second,

[1] Henceforth, the abbreviation EUR is used to address our European countries sample. In A.1.2 in the Appendix, a detailed description of the respective countries is given.

[2] Among others Blomström and Kokko 1997; Borensztein et al. 1998; Markusen and Venables 1999; Rodriguez Clare 1996; Görg and Greenaway 2004.

these studies do not investigate the role of different source countries, most notably EUR or NA for LA. However, evidence suggests that the pattern and motivation of EUR-FDI and, thus, its impact on the host country differ from those of NA. EUR companies have invested in manufacturing and, recently, in public utilities and the service sector mainly through acquisitions. In contrast, NA investment has focused on greenfield investment in the manufacturing sector (UNCTAD 2004; Vodusek 2004).

This paper takes the evidence on varying data patterns for FDI decisions in LA serious and incorporates it in the most comprehensive empirical investigation conducted up to now. We analyze the impact of FDI in the period of rapidly increasing FDI inflows, 1990–2003, and account for varying investment patterns to disentangle potentially different productivity effects. Thus, our study first analyzes total FDI inflows but then distinguishes between NA- and EUR-FDI. To consider potential conditional factors for a positive FDI-growth nexus, we look at more than 20 different indicators which can be clustered into human capital, institutions, infrastructure, trade, macroeconomic policies, and socioeconomic structure. In addition to numerous interaction terms of these indicators with FDI, we allow for parameter heterogeneity between different groups of LA countries.

In order to estimate this comprehensive canonical growth regression properly and to identify robust model specifications, we use Bayesian Model Averaging (BMA). BMA was introduced in cross-country growth regressions by Brock and Durlauf (2001) and Fernández, Ley, and Steel (henceforth FLS) (2001a), and later adapted to a panel framework by León-González and Montolio (2004). Since then its applications to growth empirics, but also to other areas, have surged.[3] Our study is the first that applies BMA to the FDI-growth nexus. BMA is flexible with respect to the size and exact specification of a model and it does not require the a priori selection of any model. Inference is based on a weighted average over all models, and a ranking in terms of explanatory power of all variables and models is endogenously determined.[4] Thus, BMA addresses the problem of parameter and model uncertainty in growth empirics. Uncertainty arises due to lacking theoretical guidance caused by the 'openendedness' of growth theory as there exists no specific model that could rule out all others (Brock and Durlauf 2001). The abundance of potential growth determinants, which are often variations of the same theoretical aspect such as different human capital variables, aggravates uncertainty.[5]

Our two BMA analyses allow us to distinguish new results. First, the FDI-growth nexus in LA depends on a country's dissemination of the rule of law and on macroeconomic

[3]Among others Brock and Durlauf 2001; Sala-i-Martin et al. 2004; Eicher et al. 2007a, Masanjala and Papageorgiou 2008.

[4]See Hoeting et al. (1999) for a general overview of the methodology.

[5]For a recent survey on the econometrics of (cross-country) growth regressions see Durlauf et al. (2005).

stability. Second, EUR-FDI is only indirectly correlated with productivity growth, whereas NA-FDI is more robust and, thus, directly correlated with productivity growth.

The paper is organized as follows: Section 2 presents the hypotheses on the FDI-growth nexus, and specifies our models. Section 3 describes the data. Section 4 describes the methodology and discusses econometric issues, most notably endogeneity in growth regressions. Section 5 discusses the results while Section 6 concludes. An Appendix presents all variables, data sources, and estimation results in detail.

2 Hypotheses and Model Specification

2.1 FDI in Latin America

Growth was high in LA in the 1960s and 1970s but faded due to the debt crises of the early 1980s. In the wake of economic reforms with the aim to reduce government interventions and induce economic liberalization and macroeconomic stabilization in line with the Washington consensus, growth has gained momentum since the first half of the 1990s. Economic liberalization also entailed an opening towards FDI. Since then, the attraction of FDI is one of the key strategies to promote growth and development in LA.

Consequently, the total stock of FDI rose steeply at a rate of around 30% per year since the mid 1990s (Levy Yegati et al. 2007). In 2003, the stock of FDI as share of GDP reached 84% in Bolivia, 74% in Chile, and 63% in Panama.[6] As Figure 1 in the Appendix shows, the increase in FDI affected all LA countries. NA- and EUR-FDI accounted for the major share of FDI stocks culminating in 70-80% in the large LA countries. In some of the smaller LA countries the share of EUR- and NA-investors is lower due to intra-LA-FDI. While NA-investment has always played an important role in LA, EUR-FDI surpassed NA-FDI stocks in South America in the 1990s. In 2003, EUR-FDI dominated in Argentina, Bolivia, Chile, Colombia, Ecuador, Peru, Paraguay and, slightly, in Brazil (see Figure 2 in the Appendix). Concerning EUR-FDI, we observe that all major EUR countries have been investing in LA to a similar extent. Only recently, Spain increased its share substantially in some countries, such as Argentina, Chile, and Peru.

One can observe clear differences between EUR- and NA-FDI in LA. We address the potentially different growth effects in the next subsection while discussing recent literature on varying motives, types, and sectors of FDI and the arising implications for productivity growth.

[6] We excluded Panama from our sample because it is a serious outlier that distorted our estimation results substantially. It serves as an off-shore tax haven and has become the company site of many NA holdings.

2.2 The Role of FDI in the Host Economy

The aggregate productivity effects of FDI on the macro level are the sum of several effects: (i) a direct productivity effect within the firm, since foreign investors commonly operate with superior technology and managerial practices; (ii) horizontal externalities on domestic firms operating in the same industry, either in the form of a rise in productivity in response to increased competition, or as knowledge spillovers when workers are trained in the foreign firm and afterwards change employment; and (iii) vertical productivity spillovers to upstream and downstream industries when the foreign firm establishes linkages and requests improved technological standards.[7]

The extent of these productivity effects depends (i) on the way in which foreign investment is provided (greenfield FDI versus mergers and acquisitions); (ii) the type of FDI (market-seeking/horizontal FDI versus efficiency-seeking/vertical FDI), which is often related to the distance of the source country, and the applicability of free trade regimes; and (iii) the main sector of investment, and the sectoral diversity of FDI.

First, it makes a difference whether FDI takes place as greenfield investment or through mergers and acquisitions. Greenfield investment usually implies larger up-front transfers of capital and introduces more advanced technologies in the new production site providing substantial direct productivity effects. However, it is less likely to source locally thus producing less spillover effects to backward industries (Javorcik 2004). These spillovers are more important in the case of mergers and acquisitions where the supplier relations of the acquired firm are kept (Javorcik 2004; Javorcik and Spatareanu 2006). The FDI share of mergers and acquisitions substantially increased in LA from 20% in the early 1990s to 50% in 2000 (De Gregorio 2003) because EUR investors used the process of privatization in LA in the 1990s to acquire public utilities, firms in the energy and telecommunication sector, and banks. Spain was particularly active in this field (UNCTAD 2004; Vodusek 2004). In contrast, NA companies were largely making greenfield investments in the manufacturing sector in Mexico (vertical FDI in the automotive and electronic industry) and Central America (Vodusek 2004).

Second, the type of FDI matters because vertical FDI typically generates less spillover effects on the local industry. Only one stage in the production is transferred to the host country to benefit from cost advantages, and the supplies are commonly imported from the source country. In such a case, the benefits of FDI culminate in a direct productivity effect, and the provision of additional production capacity offering employment and upgrading of skills (Peters 2000). With horizontal FDI, on the other hand, the entire production

[7] Rodriguez Clare 1996; Aitken et al. 1997; Blomström and Kokko 1997; Borensztein et al. 1998; Markusen and Venables 1999; Görg and Greenaway 2004.

process of a product is placed in the host country providing substantial direct and indirect productivity effects. Geographically close partner countries, labor cost differentials, and free trade regimes promote vertical FDI. Javorcik et al. (2004) show for Eastern Europe that the distance to the source country and the existence of free trade arrangements result in different types of investment and, therefore, different magnitudes of spillovers.

In 1990–2003, EUR-FDI in LA consisted of a larger share of horizontal FDI because home markets were too distant and the extent of free trade between EUR and LA countries was limited. EUR-FDI in the automotive industries in Brazil, Mexico, and Argentina or in the machinery industry in Chile constituted market-seeking investments in sophisticated products to conquer new markets (Vodusek 2004). In contrast, for NA investors, LA countries are close and free trade arrangements are well established with Mexico and Central America in the NAFTA and CAFTA, respectively. Consequently, a large share of NA-FDI in Central America takes place as vertical FDI to benefit from cheap labor costs. All intermediary goods are easily imported under the free trade regime and final products are re-exported to NA. This type of maquila industry is widespread in Mexico and Central America in the machinery and electronics industry (Gomez Vega 2004).

Third, the sector of FDI matters. Investments in the manufacturing sector are likely to generate more spillover effects to the local economy through linkages than investments in the primary sector, which uses imported capital goods, and operates rather independently (Alfaro and Rodriguez-Clare 2003). However, FDI in the service sector generates an even higher magnitude of spillovers as it improves the efficiency of local services. Thus, it enables general productivity gains in the economy (Arnold et al. 2006). Examining UNCTAD data of the largest affiliates of EUR- and NA-investors in 2002, we find that in almost all countries the share of EUR-FDI invested in the service sector is larger than the share of NA-FDI, and that EUR firms are present in many important areas such as telecommunications, banking or supply of gas, water, and electricity. Moreover, EUR firms are more numerous, smaller, and more dispersed over all types of industries than NA firms in South America. In Central America, in contrast, the number of NA-affiliates is larger than that of EU-firms. Here EUR-FDI tends to be more concentrated (UNCTAD 2002).

Finally, productivity effects from FDI seem to depend on the conditions provided in the country, most notably a sufficient basis of human capital (Borensztein et al. 1998), the level of income (Blomström et al. 1994), the openness of the economy (Balasubramanyam et al. 1999), and financial development (Alfaro et al. 2004).

2.3 Model Specification and Control Variables

As argued by de Mello (1997, 1999), FDI has a constant marginal product, unlike physical capital. Thus, it should have a permanent effect on the growth rate. Since FDI (i) incorporates new technologies in the production function and (ii) leads to (knowledge) spillovers, an endogenous growth model is a suitable framework to analyze the FDI-growth nexus (De Mello 1997, 1999). Borensztein et al. (1998) derive the impact of FDI in an endogenous growth model analytically. They consider an economy that operates with a variety of capital goods as inputs. A part of those capital goods comes from foreign producers (FDI). The introduction a new type of capital good requires technological knowledge from outside. The higher the fraction of foreign capital goods, the lower are the costs to introduce new varieties. Borensztein et al. (1998) show that the growth rate in the technologically lagging economy depends on the level of FDI because it increases the rate of technology diffusion from developed countries.

We follow this approach and consider FDI in an endogenous growth model with physical and human capital, and numerous other growth determinants. Consequently, we specify the following canonical growth regression (subscripts i and t suppressed for simplicity):

$$\begin{aligned} y = \alpha + \beta_1 INV + \beta_2 \mathbf{HC} + \beta_3 FDI + \beta_4 TRADE + \beta_5 \mathbf{MACRO} + \beta_6 \mathbf{INFRA} + \\ + \beta_7 \mathbf{INST} + \beta_8 \mathbf{STRUC} + \beta_9 FDI * \mathbf{HC} + \beta_{10} FDI * TRADE + \\ \beta_{11} FDI * \mathbf{MACRO} + + \beta_{12} FDI * \mathbf{INFRA} + \beta_{13} FDI * \mathbf{INST} + \varepsilon. \quad (1) \end{aligned}$$

In this panel data model, a country's productivity growth, y, is explained by gross fixed capital formation, INV; three different human capital variables contained in matrix **HC**; our regressor of major interest, FDI; real trade openness, TRADE; 3 macroeconomic variables in matrix **MACRO**; 6 infrastructure variables in matrix **INFRA**; 8 different institutional variables in matrix **INST**; 3 structural variables in matrix **STRUC**, and country specific fixed effects, α, to account for unobserved heterogeneity among countries. Additionally, we include 17 interaction terms of FDI with human capital, trade, macroeconomic variables, infrastructure, and institutions.[8] For the estimation with decomposed EUR- vs. NA-FDI the number of interaction terms doubles.[9] Introducing interaction

[8]Since BMA is capable of handling highly collinear regressors, we use simple products as interaction terms. The algorithm described below appropriately weights information added to a regression from two collinear variables: the Markov Chain will not incorporate models containing regressors that are collinear to those already included as there is no additional information provided in such a model. In fact, the algorithm avoids such models and assigns high posterior model probabilities only to models not characterized by this problem (FLS 2001a).

[9]Concerning EUR- and NA-FDI, inherited and present cultural ties could also be conditioning factors to benefit from FDI. However, particularly investment from EUR originates from quite different countries,

terms is in line with the literature which assumes threshold effects for the positive growth effects of FDI. Moreover, it allows us to account for heterogeneity in the spillover effects of FDI between our countries by making the coefficients of the interaction terms to be itself functions of FDI. Additionally, we allow for parameter heterogeneity in our estimations by including slope dummy variables for two different country groups: the large economies, D1, and the rich economies, D2. We apply these dummies to all variables in HC, FDI, TRADE, and STRUC.

What are our hypotheses concerning the direction of influence for these variables? Growth theory suggests that the availability of human capital plays an important role for growth (for a recent survey see Benhabib and Spiegel 2005). Therefore, we test for the impact of primary, secondary, and tertiary level education. Our data show that the share of population who completed each level of education increased in LA over the period considered. In primary and secondary education, the increase was only modest, whereas it was very pronounced in tertiary education. As argued in the human capital literature, we use the change in educational attainment instead of enrolment rates as the latter are too volatile to yield reliable estimation results (among others Temple 2001). The growth impact of education may differ for our country subgroups (D1 and D2), though. For rich economies an increase in tertiary education will be more important while the poor may benefit more from an increase in primary and secondary education. Similarly, tertiary education may be more important in bigger economies because the availability of employment opportunities for university graduates is generally larger in big countries. In general, the dummies should capture differences between social costs and benefits among the different levels of education (Jimenez 1986). Aside from being a growth factor, human capital could be an important precondition for productivity gains from FDI (Borensztein et al. 1998). Therefore, we also interact human capital with FDI.

There is wide theoretical and empirical evidence of the positive effects of trade openness on growth. Increased openness of a country should force local exporters to improve their productivity to compete on world markets whereas imports should constitute a channel of technology transfer (for recent surveys see Alesina et al. 2005; Ventura 2005). Trade openness generally increased in LA countries during the period although some countries (Venezuela, Paraguay, Colombia) also faced a prolonged decline of exports. We test the impact of real openness on growth, with real openness being the share of exports and imports in current international US$ to GDP in purchasing power parity (PPP) current international dollars. According to Alcalá and Ciccone (2004), this measure is superior to regularly used nominal measures for trade openness. It appropriately accounts for

only some of which having historical links with LA. Furthermore, recent socio-economic relationships between LA and both EUR and NA are very diverse.

potential price changes in nontradable goods due to productivity effects from openness accruing more to tradables. Moreover, we account for the possibility that the initial income level and the (market) size of a country have an effect on productivity gains from trade openness. Loayza et al. (2005) interact their measure of openness with GDP per capita and find that the growth effects of trade openness increase with the level of income. Alesina et al. (2005) analyze the relation between size, openness, and growth and find a complementary relationship between the benefits of trade openness and (market) size. Therefore, we interact real openness with both dummies for the rich and the big economies. Furthermore, trade openness may act as a conditional factor for a positive FDI-growth nexus because open economies are supposed to be more adapted to external competition and to take advantage of technology transfers (Balasubramanyam et al. 1999). Thus, we interact FDI and real openness.

There is ample evidence for the importance of macroeconomic policies for economic growth (for a recent survey see Easterly 2005). In LA, macroeconomic stability became a particular concern after the debt crises of the 1980s. The countries faced high inflation (sometimes hyperinflation), high external debts, and government deficits. This was accompanied by high interest rates and substantial currency devaluations (Corbo et al. 2005). Extensive reforms increased macroeconomic stability, most notably in inflation and exchange rate volatility. We test whether the improved macroeconomic stability was beneficial for growth in LA using inflation volatility, debt to export ratio, and exchange rate volatility as macroeconomic indicators. High values in our indicators are supposed to increase economic uncertainty, worsen the business climate, and, consequently, reduce growth. Since the generated uncertainty might also reduce the productivity effect of FDI, we interact these macroeconomic variables with FDI.

The growth effects of infrastructure investments are usually found to be positive. For example, Calderón and Servén (2004b) find that the quantity and quality of infrastructure in general, and in particular of roads, telecommunication, and electric power have a positive impact on growth. Calderón and Servén (2004a) show that infrastructure endowments of LA lag behind other middle-income countries, and that respective investments suffered from the retrenchments of public budgets since the mid 1980s. We find that road networks and electricity generating capacities in LA have grown modestly in general but stagnated in several countries. Telecommunication services, such as telephone mainlines, internet, or PC-use, steeply increased in the 1990s. Besides its direct contribution to growth, infrastructure is likely to be a conditional factor for a positive FDI-growth nexus. Thus, we also interact the infrastructure variables with FDI.

Recent empirical growth research finds that the quality of institutions is an important prerequisite for and complement of economic growth (for a survey see Acemoglu et al. 2005). In their growth regressions for LA, Bengoa and Sanchez-Robles (2003) use the Fraser Institute's indicator for economic freedom as institutional variable and find a significantly positive impact on growth. This composite index comprises subjective judgements by experts and is often used in growth regressions. As we think it is important to distinguish between single aspects of institutional quality rather then to look at a composite index, we use detailed institutional data for LA available from the International Country Risk Guide (ICRG). We consider the ICRG's composite indicator for institutional quality, political risk. Additionally, we include those components that seem to be most important for LA: corruption, democratic accountability, law and order, and military involvement in politics.[10] The political risk rating, corruption, and the rule of law generally improved in LA during the 1990s but deteriorated in the second half of the 1990s or after 2000. Democracy generally improved (with the exceptions of Venezuela and Colombia), and the involvement of military in politics generally decreased in parallel.[11] However, the role of democracy and military involvement for growth is ambiguous (Tavares and Wacziarg 2001; Albornoz and Dutta 2007). Finally, we expect that FDI and the quality of institutions in the host country, most notably the level of corruption or the rule of law, reinforce each other. In line with the literature that analyses the interdependence of productivity gains from trade and the quality of institutions (for a survey see Winters 2004), we expect that a stable institutional environment increases spillovers from FDI on productivity growth in a country. Thus, we interact all institutional variables with FDI.

Finally, we consider sectoral structures and the degree of urbanization in matrix STRUC, which we also regard as proxies for different initial conditions in our country sample. LA countries have been experiencing a steady decline of the agricultural sector, and an increase in the industrial and service sector. However, there are considerable differences between countries. We expect that richer LA economies will enjoy more growth if they possess a substantial industrial sector while an increase in agriculture would be negative for growth at that stage of development. Therefore, we interact the two sectoral variables with the dummies D1 and D2. Finally, a higher degree of urbanization should lead to agglomeration advantages and enforce productivity growth (Henderson 2005).

[10]An exploratory correlation analysis showed that there is no high correlation between these different institutional subcategories in LA.

[11]Interestingly, in Brazil and Mexico the political role of the military increased. Note, however, that military involvement in politics does not mean necessarily any direct involvement, for example in the form of a military government. It comprises very subtle influences of the military in general executive decisions.

3 Variables and Data

We include 16 LA countries in our analysis which are listed in the Appendix. The time period considered is 1990–2003. We are interested in the (direct and indirect) productivity effects of FDI on economic growth and take the annual growth rate of GDP per labor force as dependent variable. Table 1 in the Appendix contains the list of included variables with detailed definitions, sources, and compilations.

For total FDI, we take aggregate LA inward stocks from UNCTAD. The FDI stock originating from NA and EUR is calculated using the inwards stocks of LA countries sourcing from NA and EUR reported by UNCTAD. Lists of the respective countries are given in the Appendix. Since these series include missing values, we complement them with inward FDI stocks from LA central banks or statistical offices and with outward FDI stocks from NA and EUR countries reported by the respective central banks and the OECD.

Several growth determinants are steadily increasing over time in LA. Hence, we identified unit roots in the following data: educational attainment shares, FDI stocks, trade openness, consumer price volatility, all infrastructure variables, all institutional variables, urban population growth, and share of agriculture. To avoid spurious regressions we take the change of these variables to obtain stationary series. By virtue of this transformation we analyze FDI flows and their effects on productivity growth. As outlined in Section 2, this is reasonable because current FDI flows should provide immediate productivity spillovers to the host economy.

4 Estimation

4.1 The Need for Model Averaging

Empirical research on the determinants of economic growth has identified numerous variables correlated with the growth rate. Durlauf et al. (2005) provide an impressive overview on variables used in growth regressions culminating in 145 regressors which can be clustered into 43 broader areas, or theories, such as education, finance, government or trade. Taking into account the limited number of observations on a national level, the number of growth determinants to be included in a regression is restricted. Any model selection, however, severely influences the results. In addition, standard results based on a single model disregard their conditionality on the model chosen. Therefore, they are often not robust to (minor) changes in the model specification and lead to uncertainty regarding the robustness and relevance of the policy conclusions.

The lacking theoretical guidance has led to the increasing use of model averaging techniques to deal with parameter and model uncertainty. Bayesian method are of particular benefit for model averaging since models are treated as random variables. Thus, the concept of averaging over models can be given a rigorous statistical foundation. Although this is not the case in frequentist econometrics, there are various ad hoc methods of model averaging. Prominent examples are Levine and Renelt's (1992) version of Leamer's (1985) extreme-bounds analysis (EBA), or Sala-i-Martin (1997), who attenuated the extreme EBA-criteria for variables as being robust or non-robust regressors. Both approaches are preferable to using only one model for a growth estimation. Nevertheless, they do not address the uncertainty about the true model entirely as each of those methods keeps certain variables constant in every model and changes only some of the regressors.[12]

In contrast, BMA does not require selecting any subset of the regressors a priori or fixing any variables as 'base-line' regressors (for a nice introduction see Hoeting et al. 1999).[13] First, given a set of potential explanatory variables, BMA separately identifies models that are expedient to explain growth by allowing for *any* subset of the explanatory variables to combine in a regression, and to estimate the posterior probability of any such combination of regressors. Second, conditional on these posterior model probabilities, the issue of model uncertainty concerning the most efficient means of stimulating economic growth can be resolved by estimating the posterior inclusion probabilities of all explanatory variables.

4.2 BMA

Alternative models M^j, with $j = 1, ..., J$, will be defined by the subsets of k^j regressors they include from the set of K regressors. Thus, all differ in their explanatory variables, contain individual effects, α_i, and are linear regression models. Since it is assumed that the individual effects enter in all models, the number of possible models is 2^K. We have data for N countries and T periods. The dependent variables for all countries and all models are grouped in vector y of length NT. The explanatory variables and the N dummy variables for each country are stacked in design matrix X of dimension NT x $(K{+}N)$. β is defined as the full $(K{+}N)$-dimensional vector of regression coefficients and individual

[12]For a detailed discussion of these model averaging techniques and their drawbacks applied to growth regressions, see Durlauf et al. 2005 and the references therein.

[13]Another slightly different approach is Bayesian Averaging of *Classical* Estimates (BACE) first proposed in Raftery (1995) and later on in Sala-i-Martin et al. (2004). This method combines Bayesian with classical estimation techniques and thus abandons the 'truly Bayesian' framework of proper, informative priors. As we are highly aware of the caveats related to this abandonment (cf. Section 4.2), we prefer using BMA.

effects. Any model M^j with T observations for country i is represented by:

$$y_i = \alpha_i \iota_T + X_i^j \beta^j + \varepsilon_i \tag{2}$$

where X_i^j is the T x k^j submatrix of regressors of model M^j and β^j is the k vector of slope coefficients, $\beta^j \ \epsilon \ \Re^{k^j}(0 \leq k^j \leq K)$. ι_T is a column vector of T ones, and ε_i is the T x 1 error vector that is normal, with covariance matrix $\sigma^2 I_T$, not autocorrelated and independent of X_i^j, α_i and β^j. Although normality is not necessary for consistency, it guarantees good finite sample properties (FLS 2001b). The effect of variables not contained in X^j is assumed to be zero.

By averaging over all models the marginal posterior probability of including a certain variable is simply the sum of the posterior probabilities of all models containing this variable. Formally, the posterior distribution of any quantity of interest, say $\theta^j (= \beta^j, \sigma, \alpha_i)$, is an average of the posterior distributions of that quantity under each of the models with weights given by the posterior model probabilities (PMPs):

$$p(\theta^j \mid y_i) = \sum_{j=1}^{2^K} p(\theta^j \mid y_i, M^j) \ p(M^j \mid y_i). \tag{3}$$

This procedure is typically referred to as BMA and it follows from direct application of Bayes' theorem (Leamer 1978). $P(\theta^j \mid y_i, M^j)$, the posterior distribution of θ^j under model M^j, is typically of standard form. However, we have to compute the PMPs due to model uncertainty. Thus, we need to choose a prior distribution over the space $\mathcal{M}$ of all 2^K possible models. Following standard practice for BMA in linear regression models, especially in the context of economic growth (Hoeting et al. 1999; FLS 2001a; Masanjala and Papageorgiou 2008), we allocate equal prior model probability to each model and set

$$p(M_j) = 2^{-K}. \tag{4}$$

This yields a uniform distribution on the model space which implies that the prior probability of including a regressor is $\frac{1}{2}$, which is independent of the combination of regressors included in the model.[14] With this prior model probability we get the following expression

[14]Some authors recommend different choices for $p(M_j)$. For instance, many researchers prefer parsimony, that is, that simpler models should be preferred to more complex ones, all else being equal. However, regular posterior odds ratios already include a reward for parsimony. Brock and Durlauf (2001), among others, raise objections against uniform priors on the model space because of the assumption that the probability that one regressor should appear in a growth model is independent of the inclusion of others whereas in fact regressors are typically correlated. They suggest a hierarchical structure for the model prior. This, however, requires agreement on which regressors proxy the same theories. As stated in Eicher et al. (2007), such an agreement is often not existent and, therefore, independent model priors are preferable.

for the PMPs:

$$p(M^j \mid y_i) = \frac{p(y_i \mid M^j)}{\sum_{i=1}^{2^K} p(y_i \mid M^i)} \tag{5}$$

where $p(y_i \mid M^j)$ is the marginal likelihood of Model M^j. This is given by

$$p(y_i \mid M^j) = \int p(y_i \mid \alpha_i, \beta^j, \sigma, M^j)\ p(\alpha_i)\ p(\sigma)\ p(\beta^j \mid \alpha_i, \sigma, M^j) d\alpha_i\ d\beta^j\ d\sigma \tag{6}$$

with $p(y_i \mid \alpha_i, \beta^j, \sigma, M^j)$ the model corresponding to (2), and $p(\alpha)_i$, $p(\sigma)$, and $p(\beta^j \mid \alpha_i, \sigma, M^j)$, the parameter priors defined below in equations (7) and (8). Since marginal likelihoods can be derived analytically, the same holds for the PMP given in (5), and the distribution given in (3).

In practice, however, computing the relevant posterior distributions is still subject to challenges as the number of models to be estimated increases with the number of regressors at the rate 2^K. Furthermore, the derivation of the integrals implicit in (6) may be difficult because the integrals may not exist in closed form. Using at least 50 regressors in our estimations, we approximate the posterior distribution on the model space $\mathcal{M}$ by applying the Markov Chain Monte Carlo Model Composition (MC^3) methodology by Madigan and York (1995) to simulate a sample from $\mathcal{M}$. MC^3 is based on a Random Walk Chain Metropolis-Hastings algorithm which draws candidate models from regions of the model space in the neighborhood of the current draw and then accepts them with a certain probability. Posterior results based on the sequence of models generated from the MC^3 algorithm can be calculated by averaging over the draws. To verify convergence of the algorithm and thus the accuracy of the posterior moments, FLS (2001b) suggest to calculate the correlation between the analytical and MC^3 PMPs for a subset of models, for example every model visited by the MC^3 algorithm, and taking enough replications to ensure this correlation lies above 0.99.

The Bayesian framework needs to be completed with prior distributions for the parameters in each model M^j, which are α_i, β^j, and σ. The choice of priors influences the results, which is why non-informative priors would be preferable.[15] However, PMPs cannot be meaningfully calculated with improper non-informative priors for parameters that are not common for all models. Thus, FLS (2001b) developed proper priors that do not require subjective input or fine tuning for each individual model. Given their conclusions, we use the following *benchmark priors* for our analysis. We take the $\{\alpha_i\}$ to be independently uniformly distributed on the real line, and also adopt a uniform prior for the scale

[15] Two recent studies have analyzed the effects of prior choices in growth regressions regarding robustness of parameter choices and coefficient estimates in detail (Ley and Steel 2007; Eicher et al. 2007).

parameter common to all models which gives us

$$p(\alpha, \sigma) \propto \sigma^{-1}. \tag{7}$$

This prior implies that all values of α and σ for $\ln(\sigma)$ are given equal prior weight. Furthermore, this distribution is invariant under scale transformations such as a change in the measurement units. For β^j we choose an informative g-prior structure

$$p(\beta^j \mid \alpha, \sigma, M^j) \sim N(0, \sigma^2[g_j X'^j X^j]^{-1}). \tag{8}$$

It is common practice to center priors over the hypothesis that explanatory variables have no effect on the dependent variable, especially when there are many regressors but it is suspected that many of them may be irrelevant. Therefore, we set the mean of $\beta^j = 0$. Hence, one only has to elicit the scalar hyperparameter g_j and, following FLS (2001), we choose

$$g_j = \min\left\{\frac{1}{NT}, \frac{1}{(K+N)^2}\right\}. \tag{9}$$

4.3 Endogeneity in Growth Regressions

Endogeneity of regressors constitutes a serious problem in growth regressions. Several of our regressors have to be considered endogenous: investment, FDI, trade, and institutions. Whenever possible, we choose our variables so that they can be assumed exogenous: infrastructure variables refer to moving averages over the last three years. Instead of the annual inflation rate we take average consumer price volatility over the last five years. Our educational variables are assumed to be exogenous because attainment rates rise only after the degree has been gained and when the person becomes part of the adult population.

Endogeneity leads to biased estimates in OLS regressions. The most common response to the endogeneity problem has been the use of instrumental variables (IV) in growth regressions. However, the application of instruments is prone to severe problems on economic and econometric grounds. Statistically speaking, one has to assure the validity of instruments, that is, that they are uncorrelated with the error term, and avoid weak instruments which would not be strongly correlated with the endogenous variable(s). Otherwise, IV estimation would lead to inefficient and inconsistent estimates. It is especially difficult to find valid instruments in the growth context because the openendedness of the theory and the complexity of the matter make it especially hard to find instruments that are not growth determinants themselves or that are definitively uncorrelated with omitted growth determinants. These problems are extensively discussed in Durlauf et al. (2005). There, the authors also provide a survey of instruments usually suggested for growth determinants but advise general caution when using IV estimation in growth empirics.

A panel data framework makes it even harder to find suitable instruments as many of the standard suggestions, for example geographical characteristics, are not time-varying. The generally proposed solution to work with lagged values of the regressors in the IV estimation is also problematic in our case. We considered lagged values as instruments for all supposedly endogenous variables. Moreover, we experimented with trade measures and tariffs as instruments for FDI or, alternatively, with tariffs as instruments for trade. All these potential instruments are not highly correlated with the respective endogenous regressors in our data set, which would seriously effect the efficiency of any IV estimation. We assume that the very low correlation of lagged and original variables stems from the fact that LA data are subject to sudden changes and rapid developments. Apart from their low correlation with the endogenous variables, these potential instruments could be conceived as being (omitted) growth determinants themselves.

Economically speaking, endogeneity of regressors means that one can establish a certain association between the dependent variable and an endogenous regressor but cannot identify a causal effect. According to Mankiw (1995) and Wacziarg (2002) growth regressions, nevertheless, can be used to benefit from. Durlauf et al. (2005: 117) summarize their position: "[...] one should accept that reliable causal statements are almost impossible to make, but use partial correlations of the growth literature to rule out some possible hypotheses about the world." In addition, Wacziarg (2002) argues that the use of IV estimation may run into a statistical exercise where the structural economic relationship is no longer investigated.

In our opinion, this is especially crucial for BMA where one is not only interested in coefficient estimates, but especially in the identification of robust regressors. The use of an instrument instead of an (endogenous) variable – originally selected to be in a model on theoretical grounds – could lead to wrong conclusions about robustness or could conflate the robustness of the instrument compared to that of the original variable. Therefore, we refrain from including instruments in our BMAs. We have to keep in mind that this will not permit us to determine robust growth determinants for the FDI-growth nexus in LA. Rather, we are able to identify robust growth correlates which can be used to establish a deeper notion on the relationship among economic growth and other prominent variables.

5 Estimation Results

5.1 Posterior probabilities

Our results for the first BMA with total FDI are based on a chain with 1,5 million recorded draws, and for the second BMA with EUR- and NA-FDI results are obtained from a chain of 2 million recorded draws. The correlation between visit frequencies and posterior probabilities lies above the recommended threshold of 0.99 for both BMAs.

First, we present results regarding model uncertainty and list the most effective combinations of regressors or model specifications. Thus, we report the PMPs for the ten best models of both BMAs and list the respective regressors they include in Tables 2 and 4. The ten best models for the BMA with total FDI account for more than 7% of the total posterior mass whereas the ten best models for the BMA with decomposed FDI account for more than 11%. The mean number of regressors in a model is six for the BMA with total FDI and seven for the BMA with decomposed FDI.

Second, we present results regarding parameter uncertainty and provide a ranking in terms of regressor importance in Tables 3 and 5. Thus, we report the posterior inclusion probabilities (PIPs) for each of the explanatory variables in both BMAs. The PIP can be interpreted as probability that the respective regressor should be included in the evaluation as it exerts some influence on the dependent variable, regardless of which other explanatory variables are included. Note that our posterior estimates are *not* conditional on inclusion as conditional estimates would overestimate coefficients but underestimate standard errors.[16]

We base our discussions in the next section on the most important regressors having a PIP very close to or above the recommended threshold of 0.50. According to Raftery (1995) evidence for a regressor with a posterior inclusion probability from 50–75 % is called weak, from 75–95 % positive, from 95–99 % strong, and > 99 % very strong. Masanjala and Papageorgiou (2008) state that a PIP of 0.50 corresponds approximately to an absolute t-ratio of one. Moreover, we discuss the regressors that are included in at least one of the ten best models. These variables do not exert a robust effect themselves but are relevant in combinations with other regressors. Thus, the are relevant when it comes to advocate policy packages instead of single policy measures. In line with Durlauf et al. (2008), we will speak of the latter regressors as being indirectly correlated with growth, whereas the regressors with a PIP of at least 0.5 are said to be directly correlated with growth in LA.

[16]See also the discussion in Magnus et al. (2008).

5.2 Discussion and policy implications

When assessing the relationship of growth with total FDI (Tables 2 and 3 in the Appendix), our BMA indicates that domestic investment and FDI under specific conditions, that is, in interaction with institutional variables, are the most robust and important growth correlates. Therefore, they are always included in the top ten models. Additional variables included in at least one of the ten best models which are positively correlated with growth are: primary education, tertiary education in the bigger economies, real trade openness, and military involvement.[17] Political risk is also included but negatively correlated with growth. From the interaction terms that are important themselves or in combination with other variables, we see that a positive FDI-growth nexus depends on institutional and macroeconomic factors in the host country: a sufficiently developed rule of law and, to a lower extent, a low share of external debt because FDI reacts negatively to large shares of external debt. Moreover, we find that there exists a robust negative correlation from the interaction of FDI and democracy with growth in LA.

The second BMA distinguishing between the FDI sources EUR and NA (Tables 4 and 5 in the Appendix) also identifies domestic investment as the most robust growth correlate. From these results we see that only NA-FDI, under certain conditions, is robustly correlated with growth. These variables are again contained in all top ten models. Additional factors that are positively correlated with growth and included in at least one of the ten best models in this second estimation are: trade openness; different types of infrastructure investments, including modern infrastructure such as PCs; and EUR-FDI in interaction with institutional variables. From the interaction terms that are important themselves or in combination with other variables, we see that both EUR- and NA-FDI are correlated with productivity growth if certain conditions are met in the host country. Both sources require a sound legal framework for a positive FDI-growth nexus, while EUR-FDI depends additionally on low political risk. NA-FDI on the other hand is especially sensitive to stable currencies as the interaction with exchange rate volatility is negative.

Summarizing the results from both estimations, we find a positive FDI-growth nexus under a well developed legal framework, low political risk, and stable macroeconomic conditions in terms of low exchange rate volatility and low shares of external debt. FDI itself is not important, whereas especially domestic and, to a lower extent, infrastructure investments appear to be positively correlated with growth in LA. In combination with other variables, real trade openness is important, too. These findings are as expected in Section 2.3 and in line with the literature.

[17] As all our institution variables are measured in such a way that a higher index indicates better institutions, the negative sign of MILI means that less military involvement is *negative* for growth.

However, some of our results are astonishing. First, a higher level of education is generally negatively correlated with growth. This could point at substantial differences between social costs and benefits among the different levels of education in LA (Jimenez 1986). The level of tertiary education is positively correlated with productivity growth only in the subsample of big countries. One reason for that might be that big economies offer more positions where tertiary education is required and that economies of scale or spillovers among university educated arise only at a sufficient size of the economy. Second, the level of corruption in a country is not important at all, which is especially surprising in LA where the poor performance in this area is usually seen as an impediment to growth. Third, military involvement in politics is positively correlated with growth in our estimations. Although this seems to be astonishing at first sight, it corresponds to the results for the interaction of FDI with democracy that exerts a negative influence in LA. Both results are in line with the literature that establishes ambiguous or even negatives effects for LA but also other countries (Tavares and Wacziarg 2001; Albornoz and Dutta 2007).

Regarding the role of different sources and their respective investment patterns and types, we find that NA-FDI is more robust and, thus, directly correlated with productivity growth in LA after having controlled for potential differences. The PIPs and the posterior estimates of the interactions of exchange rate stability and rule of law with NA-FDI are higher than the interactions of political risk or rule of law with EUR-FDI. Strictly speaking, only the interaction terms with NA-FDI are able to pass the threshold of a PIP of 50% over which to call a regressor effective. However, both FDI variables appear in interactions among the ten best models implying that both are related to growth in combination with other standard growth correlates in LA.

Summarizing, the large up-front capital transfers of NA-FDI directly contribute to productivity growth in LA and serve as new vintage capital in key branches. Moreover, NA-FDI seems to be more important for growth because of the higher technology and know-how imports of efficiency-seeking (greenfield) FDI. EUR-FDI, on the other hand, is mainly engaged in mergers and acquisitions. Thus, it primarily modernizes formerly state-owned firms and enables technological spillovers through upstream and downstream linkages. However, EUR-FDI is only indirectly correlated with productivity growth in LA, that is, when it is combined with other growth enhancing factors.

6 Conclusion

This study investigates the FDI-growth nexus in 16 LA countries in the period of rapidly increasing FDI inflows, 1990–2003. We use a canonical growth regression and estimate robust model specifications by Bayesian Model Averaging (BMA). In line with observed data patterns, we first analyze total FDI inflows but then distinguish between NA- and EUR-FDI. In doing so, we account for the major shifts in the regional composition of these inflows since the 1990s and for the varying types and motives of FDI coming from EUR as opposed to NA-FDI. We look at more than 20 different controls which can be clustered into human capital, institutions, infrastructure, trade, macroeconomic policies, and socioeconomic structure. To account for potential conditional factors for the FDI-growth nexus in LA, we add interaction terms of these controls with FDI. These interactions also allow us to account for heterogeneity in the spillover effects of FDI between our countries by making the coefficients of the interaction terms to be itself functions of FDI. Finally, we allow for parameter heterogeneity between different groups of LA countries.

We apply BMA as it addresses parameter and model uncertainty in growth empirics arising from lacking theoretical guidance. BMA is flexible with respect to the size and exact specification of a model and does not require the a priori selection of any model. Inference is based on a weighted average over all models, and a ranking in terms of explanatory power of all variables and models is endogenously determined. Consequently, our findings entail new insights in the conflicting results on the FDI-growth nexus in LA in two respects: We are in the position to suggest model specifications that are more robust and, therefore, more reliable as they were selected 'conditional on model uncertainty'. On that account, our paper provides an 'external robustness check' for related studies showing contrasting results. Moreover, our own policy implications are more robust because we use consistent time and country samples in one unified, statistically rigorous method.

Our two BMA analyses allow us to distinguish new results: First, FDI is robustly correlated with productivity growth in LA subject to certain local conditions. Necessary prerequisites are a sufficiently developed rule of law and a low share of external debt. The insights gained from the use of conditioning factors are important and specific to the situation in LA. In other country contexts an educational or income threshold as well as trade openness seem to be important for productivity effects of FDI. For the FDI-growth nexus in LA, on the contrary, a stable legal and macroeconomic environment seems to be most important.

Second, domestic investments is the most robust growth correlate independent of the other variables included in our two regressions. In combination with other regressors, real trade openness, infrastructure, the degree of political risk and of military involvement in politics, as well as human capital are important factors, too. Regional heterogeneity does not seem to be an issue in our study, only the growth effects of tertiary education differ between large and small countries.

Finally, we find evidence in favor of NA-FDI being more robust in and important for the FDI-growth nexus in LA. Therefore, we conclude that NA-FDI with its stronger presence in greenfield investments and vertical FDI generates more productivity spillovers than the primarily horizontal EUR-FDI that is mostly oriented towards mergers and acquisitions. The large up-front capital transfers of NA-FDI directly contribute to productivity growth in LA and serve as new vintage capital in key branches. Moreover, NA-FDI seems to be more important for growth because of the higher technology and know-how imports of efficiency-seeking (greenfield) FDI. EUR-FDI, on the other hand, is mainly engaged in mergers and acquisitions. Thus, it primarily modernizes formerly state-owned firms and enables technological spillovers through upstream and downstream linkages. However, EUR-FDI is only indirectly correlated with productivity growth in LA, that is, when it is combined with other growth enhancing factors.

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Appendix

Figure 1: Total FDI stock in LA 1990–2003 (share of GDP)

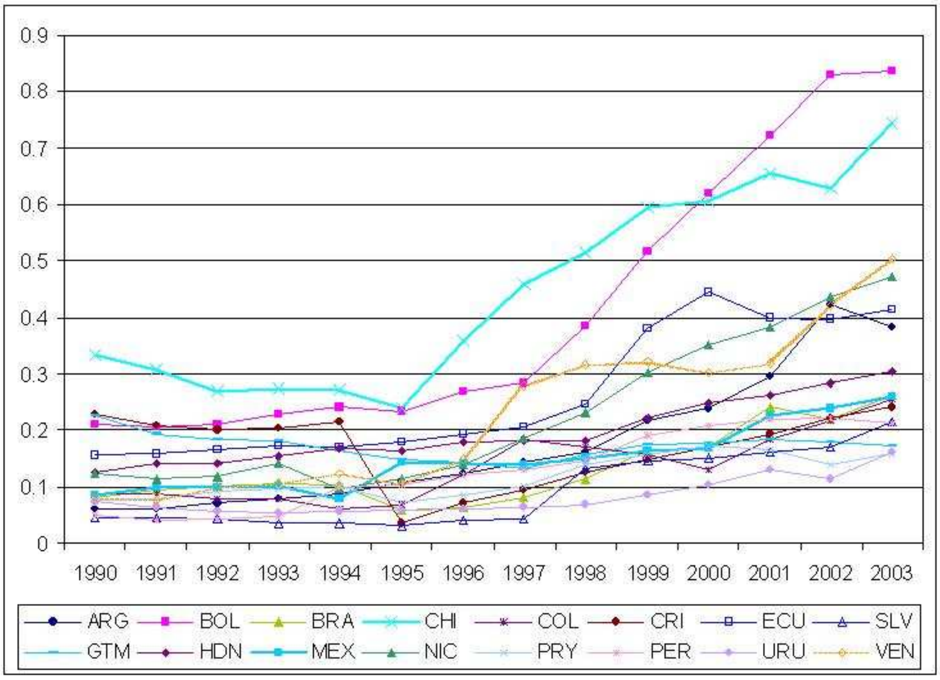
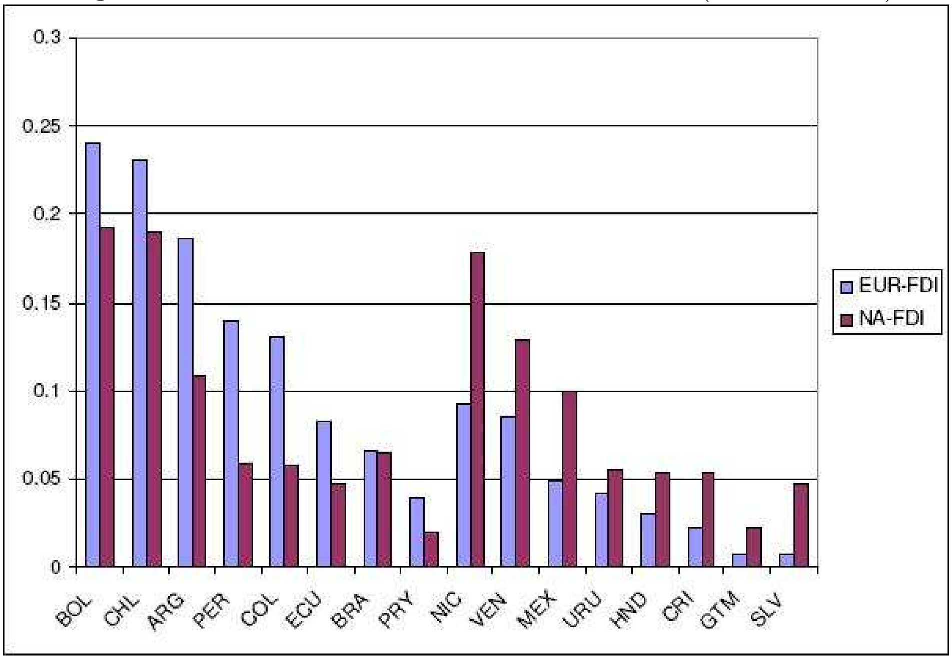


Figure 2: EUR- vs. NA-FDI stock in LA in 2003 (share of GDP)



Countries in estimation

Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Peru, Paraguay, Uruguay, and Venezuela.

European source countries

Austria, Belgium, Denmark, France, Germany, Italy, Liechtenstein, Luxembourg, Netherlands, Portugal, Spain, Sweden, Switzerland, and United Kingdom.
The respective EUR countries may vary from one LA country to another since not all European countries are present in all LA countries (e.g. Portugal invests practically only in Brazil). EUR investment is slightly underestimated since official series do not report data for small investors below a certain threshold.

North American source countries

Canada and United States of America.

Table 1: Variables and data sources

Variable	Definition	Source	Remarks
$GROWTH_{LF}$	Share of real GDP growth per labor force	WDI 2005	Constant US$ in 2000
INV	Share of gross fixed capital formation in GDP	WDI 2005	
LIT	Change of literacy rate	WDI 2005	
PRIM	Change share of adult population with completed primary education	Barro/Lee (2000)	Missing years interpolated
SEC	Change share of adult population with completed secondary education	Barro/Lee (2000)	Missing years interpolated
TERT	Change share of adult population with completed tertiary education	Barro/Lee (2000)	Missing years interpolated
FDI_T	Change share total FDI stock in GDP	UNCTAD	Generated from inward stocks of LA data by country of origin
FDI_{EUR}	Change share FDI stock from Europe in GDP	UNCTAD	Data completed with data from OECD International Investment Directory for EUR countries, data from central banks, and statistical offices

Table 1: continued

Variable	Definition	Source	Remarks
FDI_{NA}	Change share FDI stock from North America in GDP	UNCTAD	See FDI_{EUR}
OPEN	Change share exports plus imports in current int. US$ to GDP in PPP current int. US$	WDI 2005	Own calculations based on Alcalá and Ciccone (2004)
CPI_{VOL}	Change consumer price volatility	IFS	Standard deviation relative to country mean, quarterly data of past 5 years
EXCH	Exchange rate volatility	IFS	Calculated from official exchange rate, national currency per US-Dollar, quarterly data of past 5 years
DEBT	Share external debt to exports, in logs	WDI 2005	
ELEC1	Growth electricity generating capacity per 1000 persons	WDI 2005	3 year moving averages
ELEC2	Electric power transmission and distribution loss, share of output	WDI 2005	
ROAD	Change paved road, km per square kilometer	Int. Road Fed.	3 year moving averages
PHONE	Growth telephone mainlines per 1000s	WDI 2005	
PC	Change growth rate of PCs per 1000s	WDI 2005	
WWW	Change growth rate internet users per 1000s	WDI 2005	
POLRI	Change political risk rating (in logs)	ICRG	Increase indicates less risk, index runs from 0 to 4.6, composite index made up of 12 components
CORR	Change corruption index (in logs)	ICRG	Increase indicates less corruption, index runs from 0 to 1.8
DEMO	Change index democratic accountability (in logs)	ICRG	Increase indicates more democracy, index runs from 0 to 1.8
LAW	Change index law and order (in logs)	ICRG	Increase indicates better law, index runs from 0 to 1.8

Table 1: continued

Variable	Definition	Source	Remarks
MILI	Change index military in politics (in logs)	ICRG	Increase indicates less military, index runs from 0 to 1.8
URBAN	Change urban population growth rate	WDI 2005	
AGRI	Change GDP share agriculture	WDI 2005	
IND	GDP share industry	WDI 2005	
$FDI_T * SEC$	Interaction term		
$FDI_T * TERT$	Interaction term		
$FDI_T * OPEN$	Interaction term		
$FDI_T * CPI_{VOL}$	Interaction term		
$FDI_T * EXCH$	Interaction term		
$FDI_T * DEBT$	Interaction term		
$FDI_T * ELEC1$	Interaction term		
$FDI_T * ELEC2$	Interaction term		
$FDI_T * ROAD$	Interaction term		
$FDI_T * PHONE$	Interaction term		
$FDI_T * PC$	Interaction term		
$FDI_T * WWW$	Interaction term		
$FDI_T * POLRI$	Interaction term		
$FDI_T * CORR$	Interaction term		
$FDI_T * DEMO$	Interaction term		
$FDI_T * LAW$	Interaction term		
$FDI_T * MILI$	Interaction term		
D1	Dummy for big economies obtained from ranking GDP in 2000 USD in 1980 and 1990		ARG, BRA, CHL , COL, MEX, PER, URU, VEN (no change of group members between years)
D2	Dummy for rich economies obtained from ranking GDP p.c. in 2000 USD in 1980 and 1990		ARG, BRA, CHL, CRI, MEX, URU, VEN (no change of group members between years)

Table 2: Ten best models for BMA with total FDI

Model	**Regressors**	**PMP** (in %)
1	INV, POLRI, MILI, FDI_T*DEMO, FDI_T*LAW	2.07
2	INV, PRIM, TERT, D1*TERT, FDI_T*DEBT, FDI_T*LAW	1.62
3	INV, FDI_T*DEBT, FDI_T*LAW	1.57
4	INV, OPEN, POLRI, MILI, FDI_T*DEMO, FDI_T*LAW	1.47
5	INV, FDI_T*DEBT, FDI_T*DEMO, FDI_T*LAW	1.46
6	INV, PRIM, TERT, D1*TERT, FDI_T*DEBT, FDI_T*DEMO, FDI_T*LAW	1.29
7	INV, PRIM, TERT, D1*TERT, FDI_T*LAW	1.26
8	INV, FDI_T*DEMO, FDI_T*LAW	1.25
9	INV, PRIM, TERT, D1*TERT, FDI_T*DEMO, FDI_T*LAW	1.20
10	INV, FDI_T*LAW	0.95

Table 3: Posterior moments for BMA with total FDI (unconditional on inclusion)

Rank	**Regressor**	**PIP**	**Mean**	**SE**
1	INV	0.9328	0.3646	0.1443
2	FDI_T*LAW	0.8768	2.0119	0.9342
3	FDI_T*DEMO	0.5992	-2.2286	2.0648
4	D1*TERT	0.4912	30.9235	34.2762
5	TERT	0.4858	-27.3063	30.3288
6	PRIM	0.3506	0.8589	1.2759
7	FDI_T*DEBT	0.3335	-0.0737	0.1152
8	POLRI	0.2634	0.0590	0.1095
9	OPEN	0.2172	0.0355	0.0761
10	MILI	0.1964	-0.0111	0.0249
11	FDI_T*POLRI	0.1915	0.9484	2.1518
12	ROAD	0.1908	0.7444	1.7009
13	PHONE	0.1267	0.0101	0.0298
14	DEBT	0.1195	-0.0024	0.0074
15	EXCH	0.1009	0.0012	0.0042
16	D2*IND	0.0920	0.0181	0.0653
17	PC	0.0721	0.0004	0.0015
18	FDI_T*ELEC2	0.0698	-0.0799	0.3642
19	FDI_T	0.0544	-0.0083	0.0465
20	SEC	0.0527	0.0292	0.1463
21	FDI_T*TERT	0.0421	-2.3524	17.2795
22	D1*PRIM	0.0382	0.0869	1.0645
23	FDI_T*ELEC1	0.0381	-0.0781	0.5018
24	FDI_T*EXCH	0.0367	0.0108	0.0758
25	FDI_T*ROAD	0.0354	1.9697	15.6244

Table 3: continued

Rank	**Regressor**	**PIP**	**Mean**	**SE**
26	D2*PRIM	0.0330	0.0078	0.9659
27	ELEC2	0.0316	-0.0038	0.0290
28	D2*OPEN	0.0314	-0.0033	0.0331
29	DEMO	0.0311	-0.0004	0.0090
30	CPI_{VOL}	0.0302	-0.0001	0.0010
31	FDI_T*OPEN	0.0286	-0.0075	0.0931
32	FDI_T*WWW	0.0284	-0.0034	0.0278
33	IND	0.0274	0.0018	0.0225
34	WWW	0.0249	-0.0001	0.0010
35	URBAN	0.0240	-0.0262	0.2544
36	D1*OPEN	0.0228	-0.0012	0.0227
37	D2*TERT	0.0221	-0.1598	1.7203
38	D2*AGRI	0.0214	-0.0057	0.0653
39	FDI_T*PHONE	0.0209	0.0046	0.1267
40	LAW	0.0204	-0.0002	0.0038
41	AGRI	0.0201	0.0020	0.0281
42	ELEC1	0.0201	0.0012	0.0130
43	FDI_T*MILI	0.0198	0.0030	0.0642
44	CORR	0.0196	-0.0002	0.0029
45	$FDI_T * CPI_{VOL}$	0.0194	-0.0005	0.0095
46	FDI_T*PC	0.0181	0.0008	0.0134
47	FDI_T*SEC	0.0173	-0.0386	1.258
48	D1*SEC	0.0166	0.0014	0.1227
49	FDI_T*CORR	0.0162	0.0015	0.0667
50	D2*SEC	0.0159	0.0033	0.0964

Table 4: Ten best models for BMA with EUR- vs. NA-FDI

Model	Regressors	PMP (in %)
1	INV, FDI_{NA}*EXCH, FDI_{NA}*LAW	2.03
2	INV, ROAD, FDI_{NA}*EXCH, FDI_{NA}*LAW	1.60
3	INV, PHONE, FDI_{NA}*EXCH, FDI_{NA}*LAW	1.16
4	INV, ROAD, PHONE, FDI_{NA}*EXCH, FDI_{NA}*LAW	1.04
5	INV, FDI_{EUR}*LAW, FDI_{NA}*EXCH	0.81
6	INV, OPEN, FDI_{NA}*EXCH, FDI_{NA}*LAW	0.53
7	INV, PC, FDI_{NA}*EXCH, FDI_{NA}*LAW	0.43
8	INV, FDI_{EUR}*POLRI, FDI_{NA}*EXCH, FDI_{NA}*LAW	0.38
9	INV, ROAD, FDI_{EUR}*LAW, FDI_{NA}*EXCH	0.37
10	INV, ROAD, PC, FDI_{NA}*EXCH, FDI_{NA}*LAW	0.30

Table 5: Posterior moments for BMA with EUR- vs. NA-FDI (unconditional on inclusion)

Rank	Regressor	PIP	Mean	SE
1	INV	0.9863	0.4282	0.1109
2	FDI_{NA}*EXCH	0.8719	-1.1674	0.5508
3	FDI_{NA}*LAW	0.6499	3.2747	2.646
4	ROAD	0.3257	1.4325	2.2564
5	PHONE	0.2420	0.0214	0.0414
6	FDI_{EUR}*LAW	0.2055	1.2375	2.6205
7	FDI_{EUR}*POLRI	0.1960	2.384	5.3025
8	D1*TERT	0.1760	9.0139	21.5982
9	OPEN	0.1726	0.0258	0.0632
10	TERT	0.1716	-8.0927	19.4724
11	PC	0.1158	0.0007	0.0022
12	FDI_{EUR}*DEBT	0.1021	-0.0578	0.1992
13	FDI_{NA}*TERT	0.0976	-26.1312	90.7631
14	FDI_{EUR}*EXCH	0.0924	0.1697	0.6128
15	PRIM	0.0787	0.1653	0.6429
16	DEBT	0.0783	-0.0014	0.0056
17	SEC	0.0698	0.0443	0.1851
18	POLRI	0.0657	0.0095	0.0414
19	FDI_{EUR}*SEC	0.0592	-3.2898	15.3363
20	FDI_{EUR}*ELEC2	0.0585	-0.2416	1.1823
21	FDI_{EUR}	0.0499	-0.0272	0.1555
22	URBAN	0.0451	-0.0909	0.4948
23	D2*IND	0.0434	0.0071	0.0396
24	FDI_{NA}*POLRI	0.0405	0.2696	1.6023
25	FDI_{NA}*ELEC1	0.0393	-0.2342	1.4086
26	MILI	0.0391	-0.0012	0.0075

Table 5: continued

Rank	**Regressor**	**PIP**	**Mean**	**SE**
27	FDI_{EUR}*CPI_{VOL}	0.0383	-0.0085	0.0527
28	FDI_{EUR}*PHONE	0.0380	0.1304	0.8549
29	FDI_{NA}*ELEC2	0.0369	-0.0563	0.3616
30	D1*PRIM	0.0358	0.0693	0.6250
31	FDI_{EUR}*ELEC1	0.0353	-0.2607	1.6904
32	D2*PRIM	0.0352	0.0496	0.5920
33	FDI_{NA}*DEBT	0.0336	-0.0073	0.0501
34	DEMO	0.0306	-0.0012	0.0082
35	D2*TERT	0.0294	-0.3094	2.3052
36	FDI_{NA}	0.0294	-0.0064	0.0710
37	FDI_{NA}*OPEN	0.0234	-0.0144	0.1765
38	D2*OPEN	0.0231	-0.0025	0.0281
39	WWW	0.0224	-0.0001	0.0012
40	FDI_{EUR}*DEMO	0.0219	-0.1105	1.0198
41	CPI_{VOL}	0.0212	-0.0001	0.0008
42	FDI_{NA}*WWW	0.0209	-0.0066	0.0618
43	EXCH	0.0208	0.0001	0.0015
44	FDI_{EUR}*OPEN	0.0202	-0.0063	0.3085
45	FDI_{EUR}*TERT	0.0201	-0.7220	25.7504
46	D1*OPEN	0.0184	-0.0010	0.0197
47	ELEC2	0.0178	-0.0013	0.174
48	FDI_{NA}*PHONE	0.0168	-0.0025	0.3804
49	D1*SEC	0.0166	0.0098	0.1613
50	AGRI	0.0166	0.0023	0.0275
51	FDI_{NA}*SEC	0.0164	0.1292	2.5559
52	FDI_{NA}*CPI_{VOL}	0.0161	-0.0009	0.0293
53	FDI_{NA}*DEMO	0.0160	-0.0209	0.2858
54	FDI_{NA}*CORR	0.0159	-0.0114	0.1777
55	IND	0.0154	0.0006	0.0132
56	LAW	0.0151	0.0002	0.0033
57	CORR	0.0146	-0.0001	0.0023
58	FDI_{EUR}*MILI	0.0142	0.00034	0.2196
59	D2*SEC	0.0141	0.0066	0.1098
60	D2*AGRI	0.0139	-0.0031	0.0487
61	FDI_{EUR}*WWW	0.0137	-0.0021	0.0397
62	FDI_{NA}*PC	0.0137	0.0008	0.0245
63	FDI_{EUR}*ROAD	0.0134	0.4735	23.7059
64	FDI_{NA}*ROAD	0.0134	0.4112	6.8318
65	FDI_{EUR}*CORR	0.0132	-0.0015	0.1815
66	FDI_{NA}*MILI	0.0128	0.0021	0.1611
67	FDI_{EUR}*PC	0.0122	0.0006	0.0340
68	ELEC1	0.0117	0.0004	0.0084