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THE EFFECT OF GOVERNANCE ON FOREIGN DIRECT INVESTMENT IN LATIN AMERICA

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(University of Debrecen, 2016)

Abstract: This paper examines the impact of good governance on foreign direct investment in Latin American countries. According to the available literature the relation is generally positive i.e. good governance makes a country attractive. The relation is not obvious in case of Latin America and other developing countries as researchers found contradictory results. I was expecting a positive relation between the Worldwide Governance Indicators and FDI regarding the source countries, and opposite relation in case of the target countries.

In theory it can be explained why high levels of corruption make the target country either more or less attractive. In order to have accurate results it is recommended to do the research for certain country groups. The study covers 18 Latin-American target countries, and 29 source countries that have been chosen from the largest investors in the World.

Even though the FDI inflow is high - that can be explained by the level of development in the target countries, their connections with developed countries and the available natural resources - only a few papers have examined what determines capital flows in these countries. The time interval of the analysis is also an important factor in this case, as determinants of capital flows in the end of the 20th century differ from those of the beginning of the 21st century.

The aim of my research is to find out whether these results contradicting most of the theory and empirical analysis still prevail in the region. This paper provides an explanation for these opposite findings, by focusing on previous studies with special attention to the relation between corruption and FDI. The gravity model was used for the empirical analysis, which is also a new approach to study FDI. WGI were included into the model as well, along with the basic explanatory variables of the equation. Separate tests were made for each governance indicator to avoid multicollinearity, and several model specifications and panel estimations were compared. Results according to the best model show that good governance is not always significant but mostly a factor of attractiveness.

JEL: F210

Keywords: FDI, Governance, WGI, Gravity Equation, PPML

Introduction

Trade openness is an essential factor for the development of small and developing countries, it also includes foreign capital import. One frequently mentioned example is the Asian tigers, but capital inflows are equally important to Latin America as well. The GDP of many Latin American countries have been increasing remarkably in the last one or two decades. One of the factors determining this growth is foreign direct investment (FDI). (*Wang-Wong (2009), Biglaiser-Deruen (2006), Zhang (2001)*) The reasons for investing like attractive tax systems, or the available resources differ among countries. (*Blonigen-Piger, 2011*) Dunning (2004) mentions the growing importance of the institutional factors, as the role of good governance and economic freedom are also crucial points to detect the target country. On the contrary Blonigen and Piger (2011) while examining the determinants of capital inflows, found that the influence of governance and policies to attract FDI was falling back with time.

Indicators describing governance in Latin America are quite unique. Generally speaking countries either have an average of good, bad or mid range values, but in case of Latin American states these values can be different within a country. In the majority of the cases the value of the indicator representing corruption is lower (which means worse) than the other indicators. Most of the Latin American countries are corrupt but the Regulatory Quality and the policies promoting the functions of the economical sector can be as good as in developed countries. The indicators and their values will be presented in more detail in the chapter of Data.

This distinctive characteristic raised the interest of researchers, so several studies were elaborated analyzing the impact of the quality of governance in Latin America. (*Bellos-Subasat (2013), Biglaiser-Deruen (2006), Biglaiser-Staats (2012), Godinez-Liu (2015)*) Indicators describing governance might come from different sources, but they represent similarly the quality of institutions.

In this paper the Worldwide Governance Indicators (WGI) are used to determine the relation between governance and FDI. With the help of the six WGI indicators the effect of the institutional system on the capital inflows can be detected between Latin American countries as target countries, and the largest FDI exporters as source countries. Related literature shows that while examining FDI the zero or missing data might cause some problems, which are controlled differently. Santos Silva and Tenreyro (2006) introduced a methodology which can be applied in this case, as it allows the presence of zero data in the analysis using gravity equation. Although gravity equation was broadly used for FDI, and in some cases even for governance indicators effecting FDI in the latter case the methodology of Santos Silva and Tenreyro (2006) has not been applied before. From this point of view it counts as novelty to use the Poisson Pseudo Maximum Likelihood (PPML) to estimate this gravity equation.

Considering zero flows are not only important in the case of Latin America. Latter it could be used to analyze any other group of countries' FDI flows.

The first section of this paper reviews available literature, first of all how gravity equation was used to study FDI, and what papers on Latin America concluded while taking into account

the quality of governance. In the second part the database will be presented, the third part introduces the methodology. The fourth part presents the results, the last section concludes.

1. Literature review

Researchers regularly deal with the factors determining capital flows. One of these factors is the governance which is defined as the traditions and institutions by which the authority in a country is exercised. (*Kauffman-Wei, 1999*) Generally speaking we would suspect that good governance attracts FDI, as the investments are protected and costs and uncertainty is low. (*Mengistu-Adhikary, 2011; Cole et al., 2009; Globerman et al., 2004*) Although there's no consensus on this statement. Good governance implies "independent judiciary and legislation, fair and transparent laws with impartial enforcement, reliable public financial information, and high public trust". (*Li, 2005*)

There are results that prove the exact opposite of the generally accepted theory, or that could not reach an unambiguous conclusion in terms of a certain indicator. This indicator is most likely going to be the corruption since its importance is diverse for firms from different countries. (*Bellos-Subasat, 2012a, 2013; Alshammari et al. 2015*) It matters which pairs of countries we analyze as it has an impact on the final results. Elaborating a study for the entire World is not impossible although loses robustness, since the characteristics that make one country more attractive than another are very divergent. To carry out more precise calculations the number of countries involved in a study must be limited by certain aspects.

The lack of good governance in middle and eastern Europe transitioning countries was not an obstacle for the incoming FDI. These countries were experiencing the transition from socialism to capitalism, which left some gaps between the two systems. Unsettled legal questions created an appealing environment for firms that had already gathered experience in countries with poor governance. (*Bellos-Subasat, 2012b*)

According to Li and Resnick (2003) the level of democracy and the protection of proprietary rights have a positive correlation with incoming capital. The 35 developing and transitioning countries studied in their article have been chosen from different continents.

Mengitsu and Adhikary (2011) involved 15 Asian countries into their analysis on incoming FDI, apart from governance indicators they also used other indicators affecting investment, such as infrastructure and human capital. In their results out of 6 indicators¹ 2 were not significant, they concluded that those countries were more attractive that achieved improvements in terms of the significant indicators in the last 12 years. Cole et al. (2009) through the example of China investigated the effect of corruption on foreign direct investments, i.e. how important the level of corruption was regarding the regions targeted.

¹ Voice and Accountability, Political stability and violence, Governance Effectiveness, Rule of Law, Regulatory Quality, Control of Corruption; find them in more detail in the chapter of Data.

According to their results if governance and the control of corruption is more effective it will promote investments.

Most of the researchers analyzing only one side of capital moves find positive relation between the quality of governance and FDI. On the other hand, if the investigation is bilateral it might lead to opposite results. This is what makes Latin-America a particularly interesting region. Studies elaborated for this region led to contradictory conclusions. The fact that the literature regarding the relationship between governance and FDI in Latin American countries is not as broad as for developed countries, and the lack of consensus makes it important to pay more attention to this region. The impact of dictatorships this group of countries experienced throughout the 20th century have not faded away entirely. During the democratic transition their institutional systems went through a quick changes, which led that some rests of the old system remained till today. The most common example is corruption which is present in most Latin American countries. (*Quiroga, 2009*)

In their research Godinez and Liu (2015) found that FDI coming from those countries which experience a high level of corruption tend to invest more in countries where the level of corruption is equally high or slightly lower. Despite this finding the increase in the export of capital in this case is small compared to the decrease when the source country has a low level of corruption and the target country has a very high level. The results are asymmetric although they show at an interesting point, that corruption can make a country attractive if the source country already has a high level of corruption. Even though their model led to interesting results the choice of countries is questionable. The paper lacks a proper explanation for the pairs of countries studied, and this can mean that the results are biased.

Bellos and Subasat (2013) also studied bilateral capital flows. The countries in their focus were the largest capital exporters as source and the Latin American² states as target. They used the gravity equation to estimate the relation between governance indicators and FDI. They concluded significant relationship, in some cases even negative however the impact was not high in either of the cases. Their data cover the period from 1985 to 2008. During these years, after most of the dictatorships ended, institutions of Latin American countries underwent exponential development. The majority of governance indicators improved, and trade openness increased which allowed more incoming capital. The results of this paper will be compared to the ones of Bellos and Subasat (2013), but focusing only on data from the 21st century. A similar investigation can result in more precise findings since governance indicators have not changed significantly in the last two decades.

Using gravity equation to study FDI is not yet common, although it has been proven that it can also be used to describe capital flows. The distance between two countries and their economic weight affects FDI as well as trade. Studies using gravity equation for capital flows mostly examined other determining characteristics such as human capital or infrastructure, which are not necessarily independent from governance but they can also be satisfying or

² With the exemption of those countries where reliable data was unavailable.

appealing in case of poor governance. (*Bellos-Subasat 2012a, 2012b, 2013*) Gravity equation requires country pairs which already increases the model's robustness.

According to an empirical analysis made for US companies good values for Rule of Law³ and the strong judiciary⁴ is important to attract investments. US companies tend to invest more in those Latin American countries where the indicators reach a better value. The aim of that research was to study in more detail the relation between political freedom and capital flow. The results show that democracy and authoriter systems do not explain capital flows since the private sector can be well regulated in a dictatorship as well. (*Staats-Biglaiser, 2012*)

Another paper by Montero (2008) analyzed if governance as a variable is introduced to the model, how would it affect FDI inflows. The relation was definitely positive, since governance is very complex and taking the average of all the aspects it covers will most probably result in positive relation due to the dominance of the aspects that affect positively the capital inflows. The costs of poor governance were taken into account. When good governance is considered as a cost reducing factor, it will attract investors more. (*Montero, 2008*)

The OECD (2002) report says that generally speaking the presence of good governance itself can make a country attractive for investments. Although the idea is logical not every author agrees with it in general. When analyzing the determinants of investment in developing countries results sometimes show that even poor governance can be attractive. (*Bellos-Subasat (2012a, 2012b, 2013), Godinez-Liu (2015)*) We tend to think that good governance is important cause it will mean protected property rights which is very important for an investing firm. On the other hand the protection can be provided next to poor governance. Open countries recognize the potentials of foreign capital, so they will try to create an appealing business environment. However they do not want to give up on the good old corruption, which is also part of indicators measuring good governance.

Bribe can ease up legal and bureaucratic processes, Méon-Sekkat (2005) describe this as “greasing the wheels”. There are different cases when poor governance will not be a problem for the investor. The first when the investor firm is used to these conditions, since it is originally settled in a poorly governed country or it has a subsidiary there. In this case it can take advantage of the lacks of the institutional system. (*Aidt (2016), Mudambi et al. (2004)*) The next on is that firms try to adjust to the particular environment present in each country. Most probably multinational companies are able to act as previously said. In the last case the importance of control is what makes a firm use FDI in a new country. An intermediary might be riskier than the costs of learning how to handle a corrupt environment. These are the so called internalization advantages. (*Erdey, 2004*) When a firm wants to appear on a new market where governance is poor it will most likely choose to use FDI as this is the method that can provide the most control.

On the other hand the “sand the wheels” theory (*Méon-Sekkat, 2005*) explains the drawbacks of poor governance. According to this point of view firms in a country of poor

³ Rule of Law is one of the Worldwode Governance Indicators, it represents how actors of economy act according to the law, and how these rules can be foreced. Find in more detail in Data chapter.

⁴ Independent judiciary, free from political preassure and corruption, is part of good governance

governance will be facing high costs. These costs are the bribe that must be paid, and the time since the lack of knowledge and information will make the arrangement of processes very slow. It will lead to costs as well when contracts can not be forced or the economic freedom is questionable. (*Hart-Moore, 2007*) These factors affect several governance indicators and naturally not all can be controlled which will hold back foreign capital.

2. Data and Methodology

2.1 Data

This paper examines the capital flows from the largest capital exporters⁵ to Latin American countries⁶. Data covers the period from 2001 to 2012. Bilateral FDI stock data⁷ was collected for the capital flows, as the aim of the paper is to estimate them with the governance indicators which change slow in time. Flow FDI data is more volatile, since there are no capital moves between country pairs every year. The UNCTAD database was used to gather FDI data. The available time interval determined the period analyzed. GDP data was extracted from World Bank database.

The Worldwide Governance Indicators (WGI) provided by the World Bank were used to represent the level of governance. WGI was calculated every second year from 1996, and every year from 2002 for each country in the World. The indicators contain important information for the researchers but it must be taken into account that they represent a subjective evaluation of one country's governance. They measure the quality of governance, "these aggregate indicators combine the views of a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. They are based on over 30 individual data sources produced by a variety of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms".⁸ The WGI do not reflect the official opinion of the World Bank on countries and governors, and it is not used for the distribution of fundings. The governance is measured in a scale of -2,5-2,5, where -2,5 is a very weak value and 2,5 is very good. Neither of the countries reach the highest or the lowest value in any of the aspects. Generally speaking Scandinavian countries score the best, while African countries the worst.

⁵ Source countries: Argentina, Australia, Belgium, Brasil, Canada, Chile, China, Denmark, Finland, France, Germany, India, Italy, Japan, Luxemburg, Mexico, Netherlands, Norway, Portugal, Republic of Korea, Russia, Singapore, South Africa, Spain, Switzerland, Sweden, United Kingdom, USA

⁶ Target countries: Argentina, Bolivia, Brasil, Chile, Columbia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela

⁷ FDI stocks are presented at book value or historical cost, reflecting prices at the time when the investment was made. For a large number of economies, FDI stocks are estimated by either cumulating FDI flows over a period of time or adding flows to an FDI stock that has been obtained for a particular year from national official sources or the IMF data series on assets and liabilities of direct investment. (UNCTAD, 2016)

⁸ <http://info.worldbank.org/governance/wgi/index.aspx#home>

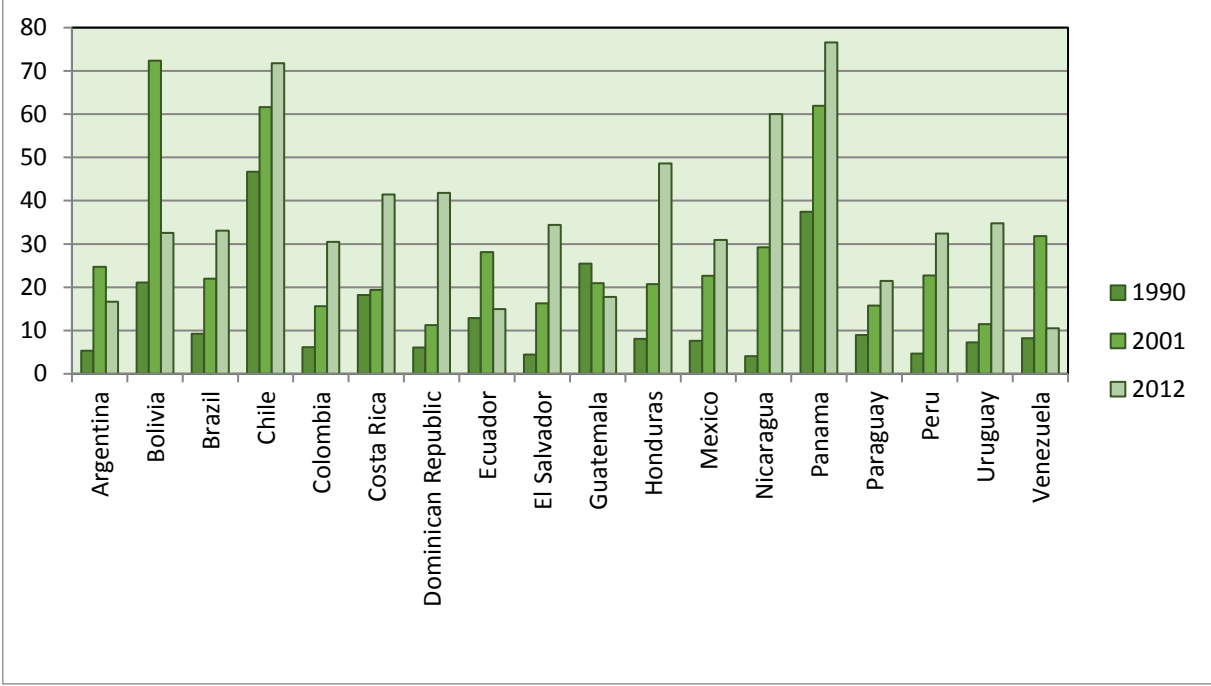
Voice and Accountability (VA) – capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. **Political Stability and Absence of Violence/Terrorism (PV)** – capturing perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. **Government Effectiveness (GE)** – capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. One of the most important factors for an investing firm. **Regulatory Quality (RQ)** – capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Another important variable which probably will give positive significant relation with the FDI, because it can not be compensated with other advantages. **Rule of Law (RL)** – capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. **Control of Corruption (CC)** – capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. CC is the indicator resulting contradictory results in different researchers' estimations. Studies made for Latin America did not get to a consensus whether corruption attract or holds back FDI, example can be found for both phenomena (*Godinez-Liu, 2015*) Either the former or the latter statement is true for the corruption, an investor with enough experience and will to adapt to the environment, will be able to handle positive and negative outcomes of corruption.

2.2 Governance in Latin America

During the Age of Discovery the region was colonized mostly by Spain and Portugal, but some other European colonizers gained territories as well. They established an institutional system that aimed to exploit natural resources. After liberalization this system was their legal heritage. The recession they experienced at the beginning of the 20th led to general dissatisfaction among the population, which helped radical parties to emerge. Most of the Latin American states were under a dictatorship for decades. This meant autarchy and closing the borders which resulted in an even more severe depression. In the years of 1980-1990 democratization started, that was followed by trade openness firstly towards developed countries and then to neighboring ones.

The Latin American countries quickly realized the potential in importing foreign capital. Their main partners were USA, Spain and Portugal. After struggling with conflicts in the 1980's and recessions in the 1990's, the strengthening of intraregional relation by the foundation of Mercosur provided new investment possibilities. during these years Argentina, Brasil, Chile and Mexico became important capital exporters in the region. Overall the lacks of the institutional system and the prevailing corruption provided some loopholes to the actors of the

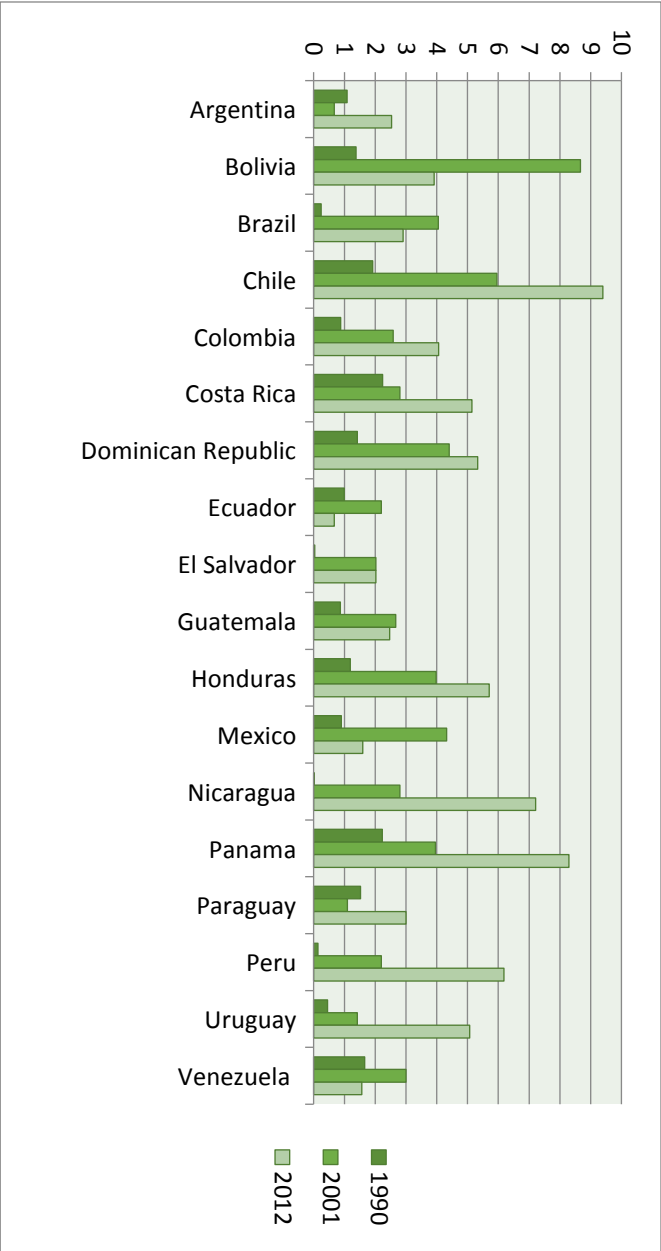
economy. In the most popular target countries those factors of governance that were generally important to investors, reached a satisfying level, such as the Regulatory Quality or laws supporting the private sector. Those countries that were not attractive enough in terms of labor, natural resources and environmental conditions did not receive support to improve their institutional system, an example to this is Paraguay. (Caetano, 2011)



1. figure: Capital import in % of the GDP (Stock data)

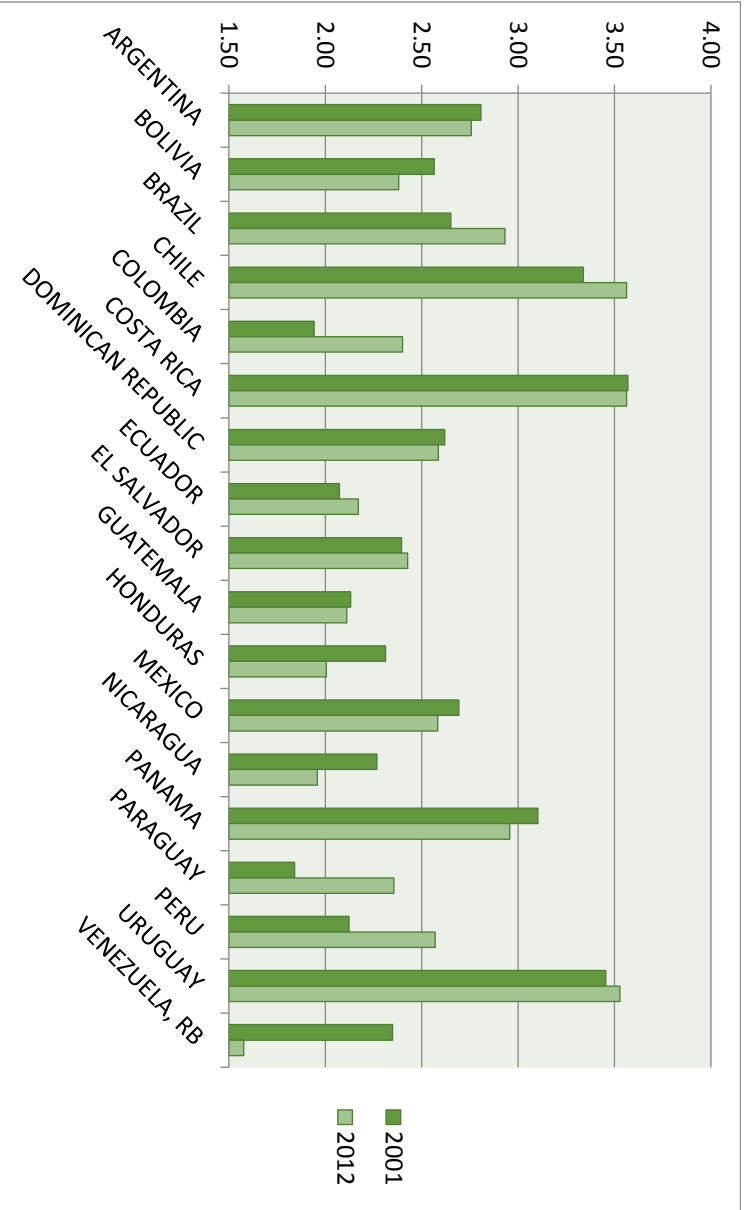
Source: UNCTAD, 2016

The amount of capital inflows increased substantially in the Latin American countries after opening to the world economy. The most outstanding states Argentina, Brazil, Chile and Mexico in the 21st century even became significant source countries. The 1. figure represents the FDI stock in the % of GDP, which allows a better comparison of the changes between countries. Except for Guatemala all in every country the FDI stock in terms of % of the GDP increased from 1990. There are some cases where the value of FDI stock is higher in 2001 than in 2012. This can be explained by the fast GDP growth that many Latin American countries experienced in the last two decades, which means a faster growth rate in GDP than in the inward FDI stock. In the 2. figure the flow FDI data can be observed, however in this case the comparison between years is not that meaningful since there might be years of high or either zero FDI flows. It is clear that right after opening the ratio of capital was small but since 2001 number and value of investments are increasing in Latin America.



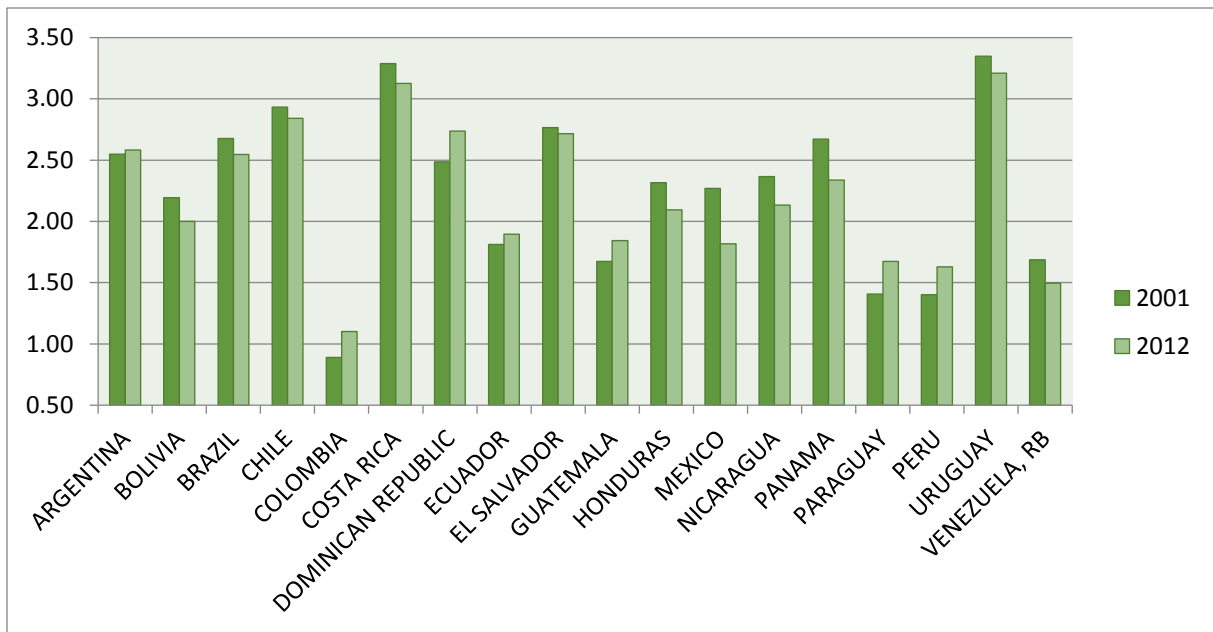
2. figure: Capital import in % of GDP (flow data)

Source: UNCTAD, 2016



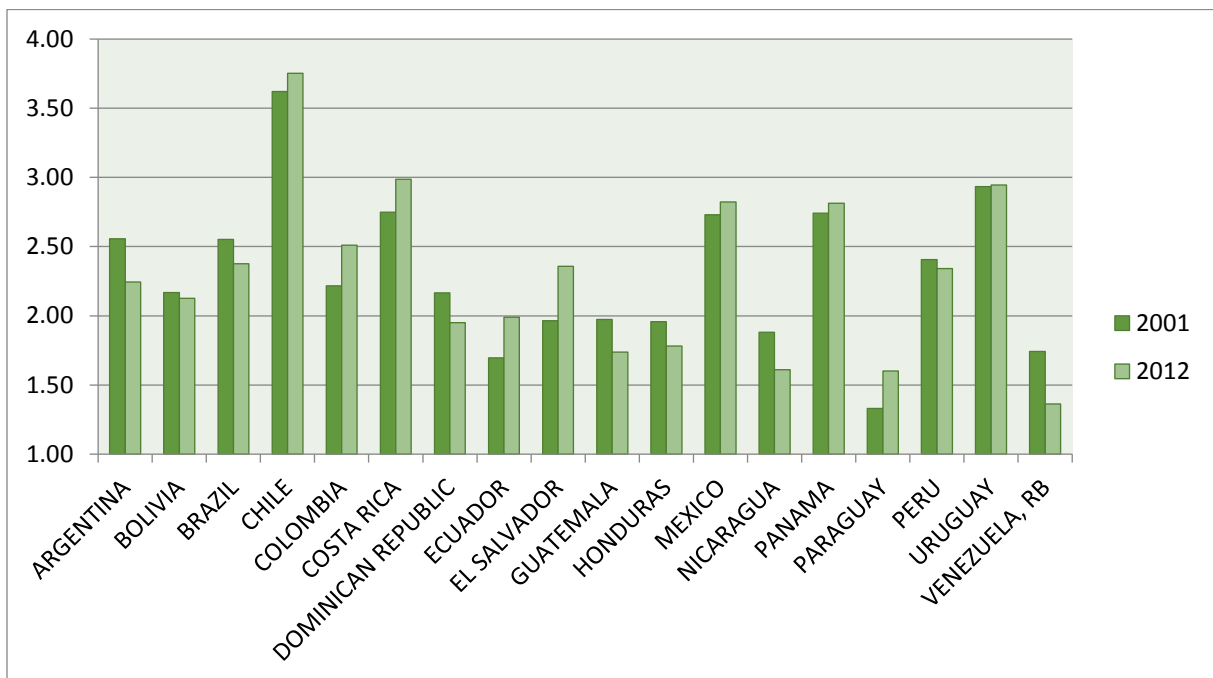
3. figure: Voice and Accountability between 2001 and 2012

Source: World Bank, WGI dataset, 2015



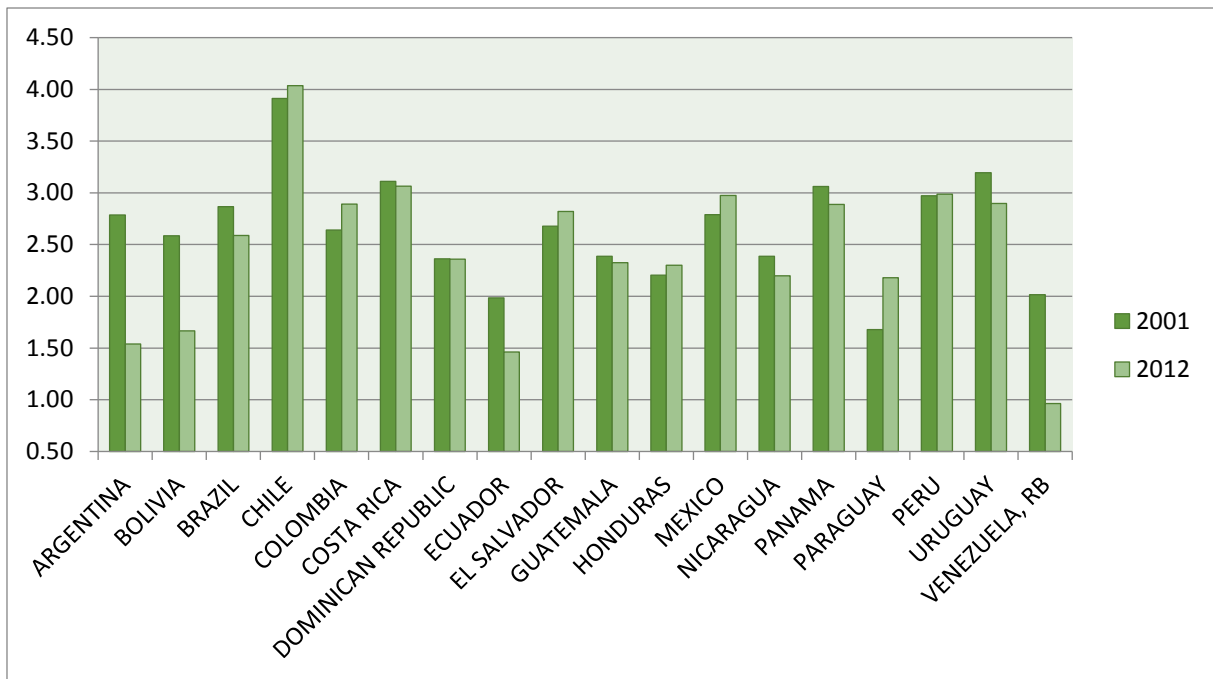
4. figure: Political stability and the absence of violence between 2001 and 2012

Source: World Bank, WGI dataset, 2015



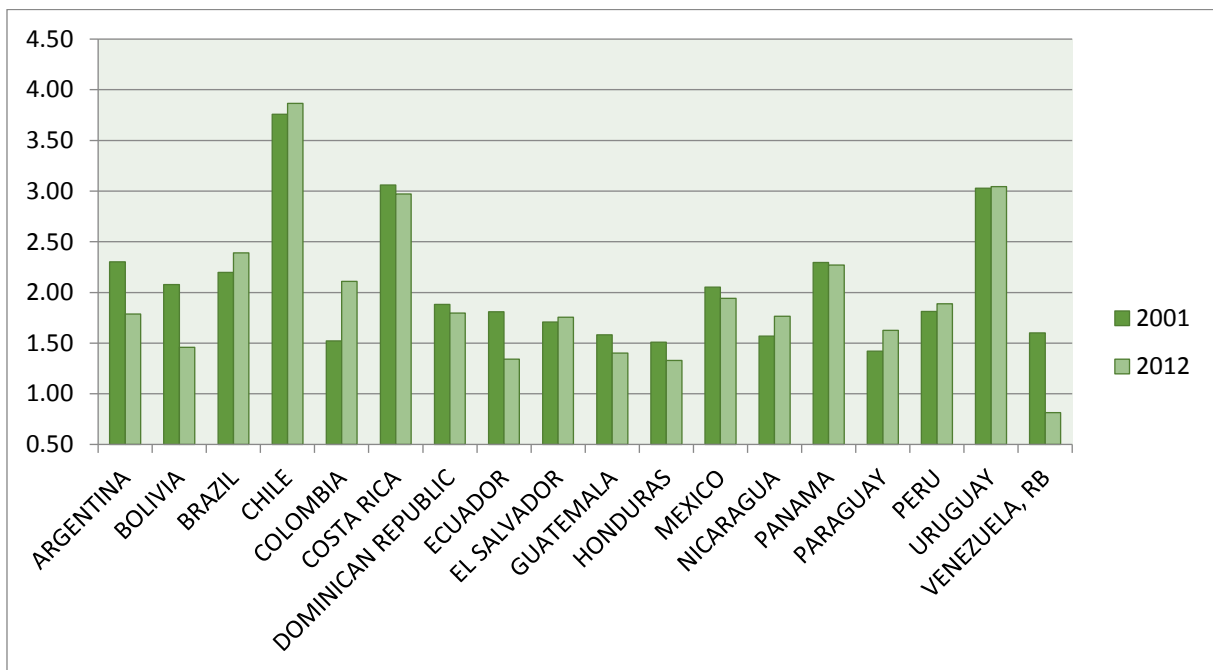
5. figure: Government Effectiveness between 2001 and 2012

Source: World Bank, WGI dataset, 2015



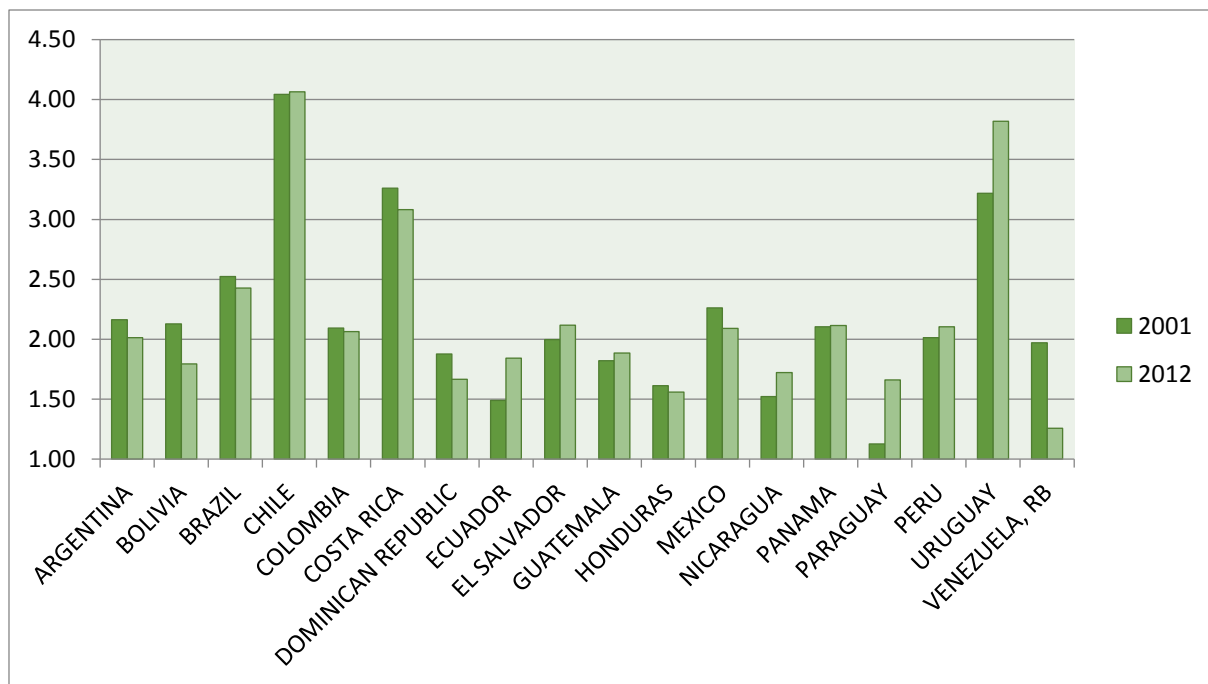
6. figure: Regulatory Quality between 2001 and 2012

Source: World Bank, WGI dataset, 2015



7. figure: Rule of law between 2001 and 2012

Source: Worldbank WGI dataset 2015



8. figure: Control of Corruption between 2001 and 2012

Source: World Bank, WGI dataset, 2015

Figures 3-8 show the WGI indicators between 2001 and 2012. For some countries the extent of the change in the indicators is not very obvious, which can be explained by the fact that the indicators measuring the quality of the institutions change slowly on time.⁹ The indicators should be understood on a scale from 0 to 5, where 0 is the worst and 5 is the best value. None of the countries reach either the extremes. For a better presentation the scale does not necessarily begins at 0.

In all of the cases Chile, Costa Rica and Uruguay reach the best values. Chile was already an important trading partner for the USA in the 20th century. Due to this the USA payed special to keep Chile's economy open and the institutions supportive towards international trade. In reality these goals were achieved by a military coup realized by Augusto Pinochet against Salvador Allende. Pinochet ruled under dictatorship in 1973-1990. (*Yoshimichi, 2013*) Colombia, Paraguay and Venezuela are the countries with the worst values. The indicators for Paraguay improved for 2012, but due the unfortunate location it's prospects have never been high. Bolivia and Paraguay are two Latin American countries that are landlocked which affected their development. Opening to international trade for Paraguay was not easy at all, since it does

⁹ The first generation reforms during the 1980' and 1990' increased the standards of life and improved the institutions of most Latin American countries. The second generation reforms (Naim, 1999) were scheduled for the 21st century, but never entered into force. The lack of the reforms slowed down the fast growing economies.

not have a competitive industrial sector and the country was affected by double tariffs¹⁰ due to the lack of a port. (*Caetano, 2011*)

In all the other cases improving and worsening indicators can be observed for both source and target countries. In terms of governance even the developed countries struggle sometimes keeping their position. The indicator for corruption in the latest years was not only decreasing for Bolivia or Venezuela, but the USA experienced a deteriorating value as well. From this point of view Latin American countries are getting closer to some exporter countries. The Regulatory Quality has a better value for each country i.e. that the law promotes the function of the private sector, which is favorable for investors. Since the variance of the indicators is quite high significant results are expected between the target countries' governance indicators and the inward FDI. The differences among countries can be informative and presumably important when it comes to deciding between target countries.

The change one or two decades after 1980 could be even more spectacular, but the WGI dataset is available from 1996. Bellos and Subasat (2013) elaborated a similar study for 1985-2008 where they mostly used the indicators from the PRS group to describe the quality of governance. On a scale from 0 to 6 even 3 unit points changes could be observed comparing the formerly mentioned two years.

2.3 Methodology

The gravity model was used for the panel data analysis. First it was introduced to economics by Tinbergen (1962), who proved that it can be used to estimate trade. The model is based on the Newtonian theory and is surprisingly effective in explaining the international trade. According to the theory the bigger the size of two economies are the trade among those countries will be larger, and the further they are located from each other the smaller the trade realized will be. In the model (equation (1)) the bilateral trade depends positively from the size of the economies and negatively from the geographical distance.

$$T_{ij} = AY_i^\delta Y_j^\gamma D_{ij}^\theta \quad (1)$$

T_{ij} is the volume of trade between country i and j , Y_i and Y_j the GDP of country i and j , D_{ij} is the geographical distance between country i and j , A is a constant i.e. the gravitational constant. The indexes (δ , γ , θ) are elasticities that show the change in the amount of trade in case of a 1% change for the given variable. The base model have been extended by other variables like GDP per capita, population, territory, common language or religion and preferential trade agreement. This methodology allows us to analyze separately the impact of each variable on trade. It is often used to evaluate or forecast the influence of a regional

¹⁰ In 2006 Mercosur countries abolished the double tariffs. This only affected Paraguay since it is a landlocked country, and the imported goods had to cross at least two borders to arrive.

integration of a preferential trade agreement. (*Carrère (2006), Koo et al. (2006)*) *Gould (1998)* used the gravity model to analyze the impact of NAFTA on the trade in North America, such as *García (2013)* to study the impact of Mercosur on the trade among the member states.

Several reserachers (*among others Bellos-Subasat (2012a, 2012b, 2013), Blonigen-Piger (2011), Paniagua et al. (2015), Mello-Sampayo (2009)*) concluded that the gravity equation can be as well used to examine the factors determining FDI. Apart from the baseline model they estimate other variables in focus of the given research.

The equation is estimated in a logarithmic form since this way the exponents can be transformed into a simple multiplication, and this makes easy to interpret the results. The parameters of the linear specification indicate the same elasticity as the exponents of the baseline model. Another reason for the logarithmic transformation is that this way the OLS, the most generally used estimation method can be applied. Although the formerly mentioned estimation method is very popular other alternatives exist. The econometric body of knowledge developed and present new possibilities for researcher to handle the usual problematic points emerging while studying international trade or FDI.

In case of international trade analysis, the zero data is an issue as well as for foreign direct investment studies. The cause of this is that there are no capital flows between each country pair every year, therefore using stock data can improve the database. In the currently used database 60% of the data is zero which mean zero or unimportant amount of capital flows. New methodologies were introduced to cope with the case when the dependent variable contain missing or zero data.

The easiest way to handle zero data is when they are not considered in the analysis, since the capital flow among the given country pairs is unimportant i.e. does not contain valuable information. (*Linders – de Groot (2006), Frankel (1997)*) Even though in theory this could work, but the model will be biased. This way fixed effect OLS or random effects GLS can be applied. When gravity equation is estimated with fixed effects the time invariant variables cannot be included, this can be solved by using random effects. (*Bellos-Subasat, 2013*) On the other hand this raises another issue, that it is impossible to control all the factors affecting FDI therefore using fixed effects improves the robustness of the model. Another alternative is when zeros are substituted with a very small number, like 1 unit which's natural logarithm is 0. This can also lead to serious bias in the model, thus it is better to avoid it when a better solution is available. (*Santos Silva – Tenreyro, 2006*)

According to Santos Silva and Tenreyro (2006) the gravity model should be estimated in its multiplicative form, which can be done by using Poisson Pseudo Maximum Likelihood (PPML). With this estimation method the zero data is not a major problem and the database can still contain it. The most important benefit is that by keeping zero data the information they offer can also be examined in the model. It must be highlighted that even by including zeros and despite of the heteroscedastic errors PPML still gives consistent results, while estimation methods for log linearized equations fail. One interesting outcome by applying PPML is that results for GDP are not necessarily 1 which means that the elasticity is not always 1 unit, as in general after using OLS.

Even though PPML was first introduced for gravity models studying trade the authors state that it can be applied for FDI analysis as well. They have proven that the method gives consistent results in case of a serious amount of zero data (*Santos Silva – Tenreyro, 2011*), other researchers repeated a similar study where 70% of data was zero. (*Gouel et al., 2012*)

PPML was applied to estimate the effect of WGI indicators on FDI. Fixed effect were used for the panel data analysis with year and country pair dummies. The main variable GDP of the gravity model appears in the equation to represent the size of the economies and capture the natural bilateral FDI. The baseline model is extended with the WGI indicators for the target and source country. Further variables can be included to the model, such as common language, common PTA, however these variables are time invariant and their effect is captured by the fixed effects applied on the estimation. The random effects estimation contain these variables, for which the results are presented in the sensitivity analysis in the appendix. The model has the following form (equation (2)):

$$\begin{aligned}
 FDI_{STt} = & \exp(\beta_0 + \beta_1 \ln GDP_{St} + \beta_2 \ln GDP_{Tt} + \beta_4 \ln WGI_{St} + \beta_5 \ln WGI_{Tt} + \sum_{2002}^{2012} \alpha_k \\
 & + \sum_{ST=2}^{287} \alpha_{ST} + \varepsilon_{STt})
 \end{aligned}
 \tag{2}$$

FDIST is bilateral FDI between S source and T target country at time t. The data covers 12 years for 18 source and 29 target countries. GDP_{Kt} and GDP_{Ft} is K and F country's GDP at time t. WGI_{Kt} and WGI_{Ft} is the WGI indicator of country K and F at time t, the variables were estimated in different models to avoid multicollinearity. Dummy variables Alfa_{KF} covers country pair specific and Alfa_k covers year specific fixed effects. Distance and other time invariant variables are left out of the equation since it is captured by the fixed effects.

3. Results

1. table: Estimation of PPML for FDI – Year and Country pair fixed effects

	Voice and Accountability		Political Stability and the lack of violence		Government Effectiveness		Regulatory Quality		Rule of Law		Control of Corruption	
	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source
GDP	0,347* (0,093)	1,434* (0,197)	0,424* (0,096)	1,248* (0,166)	0,453* (0,096)	1,387* (0,159)	0,428* (0,092)	1,447* (0,183)	0,191** (0,090)	1,520* (0,158)	0,337* (0,093)	1,333* (0,182)
WGI	1,005* (0,344)	-0,562 (0,993)	-0,113 (0,114)	-0,777* (0,251)	0,519 (0,394)	-0,195 (0,649)	0,946* (0,253)	-0,304 (0,651)	1,024* (0,198)	-4,384* (0,921)	1,041* (0,297)	0,683 (0,449)
Number of Observations	3756		3756		3756		3756		3756		3756	
R ²	0,959		0,958		0,960		0,962		0,962		0,962	
Ramsey RESET test	0,379		0,793		0,139		0,360		0,849		0,114	

Note: * stands for results significant in a 1% level, ** stands for results significant in a 10% level. Standard errors are in parenthesis.

Using PPML is the most convenient estimation method in this case since it is not only applicable for a dependent variable with many zero data but also gives unbiased and consistent results in presence of heteroscedastic errors, when OLS or GLS fails.¹¹ With the Ramsey RESET test it can be checked if the appropriate model was estimated and that potential specification errors have been avoided. When the null is accepted the model is free from specification errors. All estimations in table (1) pass the RESET test.

Due to the amount of zero data special estimation methods are ought to be used. Other methods have been compared to PPML. OLS can only be used on positive data, since all variables must be taken in their logarithmic form. This can only be applied when zero data are eliminated from the database, which will lead to biased results. Despite of this Linders and de Groot (2006) suggest that it can be the simplest solution to the problem and the results received are satisfying.

Compared to the former option substituting zero data by a very small number like 1 USD to get a logarithm equal to 0 could be a better choice (*Frankel, 1997*) Changing the data still raises the risk of bias in the model. In both of the cases the bias and the probability of inconsistent results depend on the characteristics of the database. These simple solutions can be applied with higher security when zero data have only a minor proportion, however the risks must be taken into account.

The sensitivity analysis presents the results for fixed effects OLS with excluding zeros and substituting them with a very small number. The results are introduced in table (2) and (4). There is a significant difference between the two estimations, which proves that it is very important how one handles the presence of zero values. The Ramsey RESET test rejects each estimation due to specification errors.

The results of the random effects estimation, as used by Bellos and Subasat (2013), are presented in table (3) and (5) respectively excluding zeros and substituting them by a very small number. There is a big difference between these estimations as well. The low coefficients the authors had as results can be explained by the exclusion of zeros. The Ramsey RESET test does not reject all of the estimations but in most of the cases some specification error is present.

Despite of the fact which estimation method was used none of my results show negative relation between FDI and governance for the target country. Even though the formerly introduced methodologies were rejected in this paper they still show an evidence that good governance attracts more FDI.

As previously mentioned one of the PPML's characteristics is that the coefficients for GDP might differ from the usual value close to 1. In case of the target country the highest value is 0,428 for Regulatory Quality. On the other hand for the source country the lowest coefficient is 1,248 which is still higher than the values expected, when using OLS. As the source countries

¹¹ See sensitivity analysis.

analyzed in the sample are relatively large economies¹² a small increase in their GDP would lead to a high increase in the amount of FDI they send to Latin America. In case of the target countries a 1% increase in their GDP will result in an increase in FDI lower than 0,5% in average. Based on these observations it can be concluded that the size of the economy matters more for the source than the target country.

The results for the WGI variables in most of the cases are significant only for one of the countries (for the target countries), with the exception of the Rule of Law where the results are significant for both countries and the Government Effectiveness when none of the coefficients are significant. For the target country in all of the cases when results are significant the coefficient is around 1 and the relation is positive. The studied source countries tend to export more capital those target countries where the governance indicators show a better quality of institutions. These indicators are Voice and Accountability, Rule of Law, Regulatory Quality and Control of Corruption.

The aim of the research is to show the relation between the governance in target countries and the FDI inflows. To elaborate the analysis it is not enough to include only the target countries' WGI variables. These variable gave a significant result only for Political Stability and Rule of Law. When the estimates are not significant means that the given WGI is relatively similar among the source countries.

The negative coefficients might raise some questions regarding the two indicators giving a significant result. Studies on the relation of the quality of governance and FDI conducted in Latin America suspected that poor governance can be attractive with special attention to corruption. (*Bellos-Subasat (2012); Godinez-Liu (2015)*) Based on their suggestions my results could have given negative relation for target and not source countries. Since these results might lead to some misunderstanding it is important to highlight that the negative sign for these coefficients – as for all of the coefficients estimated – must be considered *ceteris paribus*. It follows that – taking every other factor given – the source country which has lower value for the certain WGI tends to export more capital to Latin America. It does not necessarily mean that countries with low quality of the given indicators are significant capital exporters. With full knowledge of the database most of the source countries have normal or good values for the WGI, but those countries that have a value lower than the average invested more in Latin America. Examples are Brasil and the USA, and contrary examples are Austria and Denmark where WGI reach the best values but their capital export is relatively low to the region.

The Government Effectiveness is the single variable which did not give significant results either to the source or the target country. Based on the model it can be concluded that the Government Effectiveness has no real impact on the capital flows in the case of countries studied in this paper. It raises some questions but the most possible explanation is that the indicator in its given form captures the government in a way that is not relevant for investors.

¹² The largest capital exporter countries in the sample: Brasil, Mexico, Germany, USA. The GDP of these countries are among the highest, which is determining for FDI, as when their GDP grows they tend to increase more the FDI.

On the other hand the reason for investing must be taken into account, as the target countries are chosen based on different factors, which can mean that the Government Effectiveness has a minor importance in making decisions.

In conclusion the results allow me to say that good governance matters, and generally those countries are more attractive for investors where the quality of governance is better.

Conclusion

The research question investigated in this paper was how the governance affect the capital inflows in Latin America. The different factors taken into account helped choosing the best possible model to estimate the parameters which would justify the conclusion that the better quality of governance matters.

The estimates for the variables Voice and Accountability, Rule of Law, Regulatory Quality and Control of Corruption are clearly positive. Observing the data there is no obvious pattern what could be common in the indicators. In all of the cases examples can be noted for deprivation or improvement, however generally in the last 12 years no significant changes happened. Being conscious of this it can still be concluded with high certainty that source countries prefer those target countries which have better values for WGI. The relatively high amount of FDI inflows to Chile, Costa Rica, Uruguay and Panama are in line with the former statement. Except for Chile the other three countries are comparably smaller economies, although an appealing institutional environment can make them attractive for potential investors. The exact reason of investing into certain countries from only this study cannot be revealed, yet it could be a question of further studies, where the Doing Business Report could be much of a help.

It is more difficult to get to a conclusion regarding source countries, although they were not in the center of attention in this paper, they worth to be mentioned. As already explained the reason for only two significant results is that the WGI indicators are similar among the source countries. Significant results show negative relation. Since the study has been made for the years of the 21st century four Latin American countries have been included, such as other developing countries like Russia, South Africa, and the Republic of Korea. These countries are becoming more and more important investors in the Latin American region, but their WGI in average is lower than in developed countries. The difference is the most obvious for the Political Stability and Violence and Rule of Law indicators which can affect the direction of the relation. It must be highlighted that the fact that the difference in their WGI is statistically important does not equal to a statement that they all have low WGI values.

The source country rather chooses those target countries where according to WGI the quality of governance is better. It must be taken into account that this paper only examines Latin American target countries, and 29 source countries that are the largest capital exporters. The

conclusions derived from the results cannot be generalized for the entire world, at the most to the Latin American region but with due diligence.

General problem of the economic models is that not enough variables can be included, since trying to get an estimate for everything would lead to meaningless results. On the other hand if the number of variables are reduced we must control for the excluded variables with some method provided by econometrics. Choosing fixed effects can be a satisfying solution if the direct aim of the study is only examining the effect of WGI on FDI.

This paper also proves that including zero data into the database is important. According to Santos Silva and Tenreyro (2006) PPML is not the only solution, but until now based on the current body of knowledge this is the best possible choice when studying a variable which has often zero or missing values. Naturally it is better when the data is zero and not missing, from this point of view my database is rather reliable since it contains only a negligible amount of missing values. The area requires improvement, that is to say in further researches it is worth to go on with finding a solution on how to handle zero data, and what estimation methods are the best based on the aim of the research.

Finally it could be useful to elaborate a similar study for other emerging regions of the world to get comparable results. After all it could be easier to conclude on the importance of governance in developing countries regarding the FDI they receive. Possible regions to study could be Africa, Central Eastern Europe and Asia.

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Appendix – Sensitivity Analysis

2. table: The effect of WGI on FDI, OLS estimation with year and pair fixed effects, zeros excluded

	Voice and Accountability		Political stability and the lack of violence		Government Effectiveness		Regulatory Quality		Rule of Law		Control of Corruption	
	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source
GDP	0,325*	0,944*	0,363*	0,918*	0,408*	0,899*	0,370*	0,964*	0,333*	1,022*	0,336*	0,907*
	(0,058)	(0,078)	(0,058)	(0,080)	(0,057)	(0,077)	(0,056)	(0,078)	(0,057)	(0,084)	(0,058)	(0,078)
WGI	0,627**	-1,907*	0,028	0,351	0,581**	1,335*	0,855*	-0,476	1,013*	-0,885	-0,107	-1,238*
	(0,295)	(0,508)	(0,086)	(0,224)	(0,280)	(0,409)	(0,155)	(0,393)	(0,185)	(0,559)	(0,215)	(0,400)
Number of Observations	2504		2504		2504		2504		2504		2504	
R ²	0,2793		0,2742		0,2784		0,2837		0,2838		0,2765	
Ramsey RESET test	0,000		0,000		0,000		0,000		0,000		0,000	

Note: * stands for results significant in a 1% level, ** stands for results significant in a 10% level. Standard errors are in parenthesis.

3. table: The effect of WGI on FDI, random effects, zeros excluded

	Voice and Accountability		Political stability and the lack of violence		Government Effectiveness		Regulatory Quality		Rule of Law		Control of Corruption	
	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source
GDP	0,563*	0,750*	0,553*	0,768*	0,581*	0,802*	0,598*	0,766*	0,555*	0,750*	0,583*	0,765*
	(0,063)	(0,090)	(0,065)	(0,092)	(0,062)	(0,087)	(0,059)	(0,084)	(0,061)	(0,084)	(0,061)	(0,088)
WGI	0,932	1,089*	-0,024	0,826*	1,004*	2,473*	0,887*	1,511*	0,973*	1,739*	0,118	1,304*
	(0,582)	(0,317)	(0,131)	(0,233)	(0,340)	(0,487)	(0,340)	(0,431)	(0,372)	(0,381)	(0,312)	(0,356)
Távolság	-1,036*		-1,088*		-0,994*		-1,098*		-1,035*		-0,970*	
	(0,199)		(0,189)		(0,179)		(0,175)		(0,183)		(0,182)	
Tengertől való elzártság	-0,644**	2,191*	-0,827*	2,207*	-0,436	1,853*	-0,497	2,118*	-0,545	1,986*	-	1,998*
	(0,275)	(0,293)	(0,282)	(0,305)	(0,278)	(0,302)	(0,291)	(0,303)	(0,285)	(0,298)	0,683**	(0,306)
Közös nyelv	1,905*		2,037*		1,825*		1,877*		1,882*		1,898*	
	(0,321)		(0,353)		(0,317)		(0,320)		(0,314)		(0,325)	
Közös vallás	0,028		0,085		0,253		0,141		0,155		0,165	
	(0,229)		(0,239)		(0,222)		(0,226)		(0,226)		(0,229)	
Közös szabadkereskedelmi megállapodás	-0,409		-0,507		0,095		-0,322		0,074		-0,139	
	(0,416)		(0,420)		(0,424)		(0,395)		(0,417)		(0,416)	
Number of Observations	2504		2504		2504		2504		2504		2504	
R ²	0,2663		0,2699		0,2745		0,2734		0,2749		0,2623	
Ramsey RESET test	0,3531		0,127		0,0411		0,0448		0,3161		0,0614	

Note: * stands for results significant in a 1% level, ** stands for results significant in a 10% level. Standard errors are in parenthesis.

4. table: The effect of WGI on FDI, OLS estimation with year and country pair fixed effects, zeros included (0+1)

	Voice and Accountability		Political stability and the lack of violence		Government Effectiveness		Regulatory Quality		Rule of Law		Control of Corruption	
	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source
GDP	1,615*	2,143*	1,444*	2,398*	1,345*	2,364*	1,513*	2,353*	1,237*	3,080*	1,336*	2,070*
	(0,262)	(0,309)	(0,271)	(0,307)	(0,268)	(0,305)	(0,264)	(0,308)	(0,264)	(0,317)	(0,263)	(0,304)
WGI	1,254	-5,889*	0,052	-8,537*	0,246	-9,023*	-0,841	-5,287*	1,350	-18,551	-0,104	-13,591*
	(1,191)	(1,773)	(0,394)	(0,871)	(1,196)	(1,743)	(0,666)	(1,538)	(0,808)	(2,050)	(0,839)	(1,634)
Number of Observations	2504		2504		2504		2504		2504		6216	
R ²	0,0798		0,0931		0,0821		0,0799		0,0911		0,0888	
Ramsey RESET test	0,000		0,000		0,000		0,000		0,000		0,000	

Note: * stands for results significant in a 1% level, ** stands for results significant in a 10% level. Standard errors are in parenthesis.

5. table: The effect of WGI on FDI, random effects, zeros included (0+1)

	Voice and Accountability		Political stability and the lack of violence		Government Effectiveness		Regulatory Quality		Rule of Law		Control of Corruption	
	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source	Target	Source
GDP	2,108*	1,971*	2,163*	1,801*	2,080*	1,960*	2,147*	1,949*	2,175*	1,994*	2,131*	1,868*
	(0,220)	(0,255)	(0,218)	(0,258)	(0,222)	(0,256)	(0,215)	(0,258)	(0,218)	(0,255)	(0,223)	(0,268)
WGI	3,392**	0,387	0,116	-3,589*	2,799**	-0,187	0,460	0,743	2,415**	-0,650	0,926	-1,134
	(0,582)	(1,078)	(0,497)	(0,916)	(1,225)	(1,617)	(1,080)	(1,025)	(1,157)	(1,110)	(0,922)	(1,115)
Távolság	-5,269*		-5,643*		-5,407*		-5,171*		-5,550*		-5,492*	
	(0,199)		(0,839)		(0,851)		(0,786)		(0,859)		(0,879)	
Tengertől való elzártság	0,745	0,364	0,462	0,804	0,950	0,417	0,515	0,247	0,966	0,571	0,723	0,480
	(0,892)	(1,184)	(0,902)	(1,206)	(0,890)	(1,202)	(0,898)	(1,200)	(0,902)	(1,194)	(0,940)	(1,205)
Közös nyelv	-1,138		-1,786		-1,145		-1,179		-1,117		-1,233	
	(1,160)		(1,173)		(1,167)		(1,182)		(1,158)		(1,188)	
Közös vallás	-0,845		-0,543		-0,816		-0,777		-0,818		-0,816	
	(0,690)		(0,713)		(0,685)		(0,691)		(0,687)		(0,705)	
Közös szabadkereskedelmi megállapodás	-2,586		-3,633*		-2,860		-2,375		-3,100**		-3,274**	
	(1,376)		(1,387)		(1,572)		(1,351)		(1,458)		(1,479)	
Number of Observations	6216		6216		6216		6216		6216		6216	
R ²	0,0770		0,0870		0,0768		0,0765		0,0059		0,0787	
Ramsey RESET test	0,0110		0,0011		0,0054		0,0138		0,3161		0,0028	

Note: * stands for results significant in a 1% level, ** stands for results significant in a 10% level. Standard errors are in parenthesis.