

Charles University in Prague  
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Master Thesis

**How Tax, Labor Market and Product Markets  
Reforms Influence Foreign Direct Investment**

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Academic year: 2011/2012

### **Declaration of Authorship**

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Prague, May 10, 2012

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## **Abstract**

This work analyses industry level Foreign Direct Investment (FDI) inflows in order to find out if their determinants are the same for all industries or if they differ and how. The second important question is if various qualitative variables as labour market or product market liberalization or taxation determines flows to individual industries. I analyse seven industries by System GMM model for period from 1994 till 2009. The results suggests that inflows to each industry are driven by distinct set of determinants. While there are nearly non-significant determinants for agriculture among explanatory variables I used, there is many of them significant for services. Concerning qualitative variables, labour market liberalization influence FDI inflows to manufacturing and mining, product market liberalization influence inflows to transportation and electricity, gas and water industry. The level of taxation seem to be significant determinant of FDI inflows to manufacturing.

## **Keywords**

FDI, Foreign direct investment by industry, Structural reforms, Labour Market, Liberalization, GMM, taxation

## **Abstrakt**

Tato práce zkoumá toky Přímých zahraničních investic (PZI) na úrovni výrobních odvětví s cílem zjistit zda faktory, které ovlivňují toky PZI do hostitelské země jsou odlišné pro jednotlivá odvětví a případně jak se liší. Druhou otázkou, kterou se tato práce zabývá je jakou roli při určování toků PZI hrají kvalitativní proměnné jako liberalizace trhu práce či produktového trhu nebo úroveň zdanění. Tyto otázky zkoumám na vzorku sedmi odvětví, Systémovou Obecnou momentovou metodou (GMM). Má analýza pokrývá období od roku 1994 do roku 2009. Výsledky analýzy naznačují, že toky PZI do jednotlivých odvětví jsou určovány odlišnými faktory. Zatímco pro zemědělství jsem ve svém vzorku vysvětlujících proměnných nenašla téměř žádnou významnou, pro služby jsem jich našla mnoho. Z kvalitativních veličin liberalizace trhu práce ovlivňuje Výrobní a těžební průmysl zatímco liberalizace produktového trhu je důležitým faktorem pro dopravu a energetický průmysl. Zdanění se ukázalo být signifikantním faktorem pro výrobní odvětví.

## **Klíčová slova**

PZI, Přímé zahraniční investice po odvětvích, metoda GMM, liberalizace trhu, trh práce, strukturální reformy, zdanění

# Master Thesis Proposal

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## Proposed Topic:

How Tax, Labor Market and Product Markets Reforms Influence Foreign Direct Investment

## Topic Characteristics:

Foreign direct investment (FDI) is one of the most important channels through which economy benefits from financial globalization. For example there has been many studies published recently which found evidence in support of a positive effect of FDI on growth via technology spillovers or other studies which suggest that FDI is the least volatile form of capital flows which make countries less vulnerable to sudden stops or reversals of flows. These benefits are reason why countries try to attract FDI, but there is question how to achieve increase in inflow FDI. Study Campos and Kinoshita (2008) analyze influence of structural reforms of capital market to the volume of FDI. They find evidence in support of positive effect of capital market liberalization to the volume of inflow FDI. I will analogously explore if also product market and labor market liberalization increase volume of inflow FDI and in addition I will consider influence of various tax reforms on volume of inflow FDI. My analysis will focus on European and South American countries. I want to construct various indicators of liberalization of labor market, product markets and tax reforms. These indicators should be comparable across countries and time. There are several possible sources where I can find information about liberalization of mentioned markets and tax reforms. I can find some information about these reforms on web pages of target countries, there are some information about tax changes in international treaties and there have been already published some studies which explore impact of liberalization of labor market and product market to macro indicators or productivity. These studies can be valuable source of information not only about concrete reforms but I can also find there indicators of liberalization of labor and products markets proposed by various authors. The main contribution of my thesis should be constructing of dataset needed for analysis of impact of product and labor market liberalization and tax reforms on inflow FDI and the analysis itself. It should help to answer the question what countries should do to attract more inflow FDI or alternatively if liberalization is the right way how to attract more inflow FDI.

## Hypotheses:

1. Labor Market Liberalization Attract More FDI
2. Product Market Liberalization Attract More FDI
3. Lower Taxes Attract More FDI

## Methodology:

I will use some of econometrics models to analyze constructed data set. I will incorporate four main groups of explanatory variables to explore effect of tax, product market and labor market reforms on FDI. The groups of explanatory variables will be as follow. The first group of explanatory variables is classical determinants of FDI as for example host country's market size or growth potential of host country's market. The second group is labor market reforms, the third is product market reforms and the last is tax reforms. The second, the third and the fourth group of explanatory variables will consist of constructed indicators of liberalization. As some of explanatory variables are likely to be influenced by response variable, I expect that I will not use OLS model to explore impact of explanatory variables to FDI because OLS would be biased. I will have to use Method of Instrumental Variable (IV) or Generalized Method of Moment (GMM) instead to explore the relationships. The advantage of IV and GMM over OLS is that these methods can extract the influence of response variables to explanatory variables and so the final estimator is not biased.

**Outline:**

1. Introduction
2. Specification of data source
  - 2.1. Data source specification for FDI
  - 2.2. Data source specification for tax reforms
  - 2.3. Data source specification for product market reforms
  - 2.4. Data source specification for labor market reforms
3. Theoretical Background
  - 3.1. Labor market reforms influence on FDI
  - 3.2. Product market reforms influence on FDI
  - 3.3. Tax reforms influence on FDI
4. Methodology
5. Empirical Analysis
6. Conclusion

**Core Bibliography:**

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# Contents

<b>Contents</b>	<b>7</b>
<b>1 Introduction</b>	<b>9</b>
<b>2 FDI inflows and host country</b>	<b>11</b>
2.1 History of politics toward FDI . . . . .	12
<b>3 Determinants of FDI</b>	<b>14</b>
3.1 Inward FDI and structural reforms . . . . .	17
3.2 Selection of Countries and Industries . . . . .	17
<b>4 Data set</b>	<b>19</b>
4.1 Foreign Direct Investment . . . . .	19
4.1.1 Primary sector . . . . .	20
4.1.2 Secondary sector . . . . .	23
4.1.3 Tertiary sector . . . . .	24
4.2 Macroeconomic Variables . . . . .	28
4.3 Qualitative Variables . . . . .	29
4.3.1 Labour Market Liberalization Indicators . . . . .	29
4.3.2 Product Market Liberalization Indicators . . . . .	29
4.3.3 Tax indicators . . . . .	32
4.3.4 Control of Corruption and Rule of Law Indicators . . . . .	32
4.3.5 Financial Market Depth . . . . .	33
<b>5 Methodology</b>	<b>35</b>
5.1 Difference and System GMM estimators - introduction . . . . .	36
5.2 Difference GMM estimator . . . . .	37
5.3 The System GMM estimator . . . . .	39
5.4 Problem of too many instruments . . . . .	41
<b>6 Results</b>	<b>43</b>
6.1 Agriculture and fishing . . . . .	43
6.2 Mining and Quarrying . . . . .	45
6.3 Manufacturing . . . . .	46
6.4 Electricity, Gas and Water . . . . .	49
6.5 Financial Services . . . . .	50
6.6 Telecommunication . . . . .	51

6.7	Transportation . . . . .	52
6.8	Industry comparison . . . . .	53
<b>7</b>	<b>Conclusion</b>	<b>55</b>
	<b>References</b>	<b>58</b>

# Chapter 1

## Introduction

During the past two decades we witnessed FDI flows increased twelve fold from its lowest value \$153 millions in 1991 to \$1971 millions in 2007 (UNCTAD, 2012). Even though the FDI become more and more important source of capital in recent years, there is still no consensus on robust FDI determinants. Despite the fact that various FDI theories have motivated wide range of potential FDI determinants, empirical studies have generated quite poor results. In fact the results are mixed or sometimes even contradictory across recent studies. One of possible explanation is that the results can be influenced by use of countrywide data sets. Countrywide FDI flows are far from being homogeneous. Actually the investment in each industry can have very different effect on economy and also it can be attracted by distinct factors. Considering at first investment to mining or agriculture, they can bring high revenues to the economy, especially to less developed countries, but they are not suppose to create much job opportunities. They can be attracted mainly by geographical factors as natural resources or by weather, but they needs also a certain level of infrastructure and property rights protection. On the other hand mining or agriculture do not have high requirements on labour force as nowadays they are highly mechanized. On the contrary, other industries as manufacturing or services are mainly expected to bring new jobs opportunities to absorb labour from lower-productivity industries. They are usually attracted more by good infrastructure, good institutional quality and by various characteristic of labour force as low wage or lower regulation of contracts.

To verify the theory that empirical studies generate poor results because of non-homogeneity of FDI flow I explore industry level data for seven industries and then I compare them to see if they differ in determinants. Furthermore this study works with two different types of FDI determinants, with macroeconomic ones and then with determinants that try to describe institutional quality. The macroeconomic

determinants, sometimes also called classical, were used many times in various studies. Nevertheless there is not wide agreement about set of robust macroeconomic variables. Usually authors work with gross domestic product per capita (GDP per capita), real exchange rate (REER), GDP growth, openness and inflation, but with mixed results. I can just say that the variable which prove to be significant and positive more often is GDP per capita. I discuss each of these variables and some previous empirical finding in next section. I selected six other variables to represent institutional quality and changes in regulation and taxation to see how these variables influence each industry and if there is something what policy-makers can do in order to increase FDI inflows to particular industries.

The main aim of this work is to analyse how various structural reforms exactly influence the amount of inward FDI for each industry. I work with industry level data because I expect that the amount of FDI flows to various industries depend differently on various structural reforms. By other worlds, some structural reforms can influence substantially evolution in one industry but they need not to be so important for another industry. In spite of the focus on structural determinants of FDI I included classical determinants to my analysis too. As far as I know there is just few studies examining industry-level FDI flows and those studies are from popular area of economic geography and examine transition countries. Thus they differ substantially from my work in terms of dataset, model and objectives.

This work is organized as follow: the first chapter describe Foreign direct investments (FDI), its benefits for a host country also historical and recent political attitudes toward them. The second chapter bring survey of recent FDI determinant's literature and motivate use of selected determinants. The third chapter describes in detail the data used for the analysis. Mainly it is focused on FDI inflows and its evolution through time and it also explain in detail indicators used to capture institutional quality. The fourth chapter describe GMM method, its assumption and advantages and also discuss extensively challenges associated with the use of method on my dataset. The fifth chapter discuss results and its implications in wider context. The last chapter summarize main aims and achievements.

## Chapter 2

# FDI inflows and host country

The inward FDI was quite controversial topic in 1980s. People saw the benefits of the FDI as the inflow of foreign capital, technological spillover, human capital formation or international trade integration, but they were also aware of possible negative effect to host economy as for example crowding-out of domestic investments, or negative impact on market structure or balance of payment. Another aspect was fear from substantial influence of multinational enterprises on host country political decisions or fear from the foreigner control over some strategic industries. Nowadays it is widely accepted that the influence of foreign companies on the politics is not usually higher than the influence of domestic firms. Also the fear from foreign control over strategic industries decreases in recent years. So what left is to determine how FDI influence the host country economy. According to recent studies, impact of inward FDI on economy depends largely on what policy the host country adopt toward them. The findings suggest that policies should equalize the domestic and foreign enterprises to keep from negative effects and to explore the positive. So host countries should adopt structural reforms focused on liberalization of various markets to encourage FDI inflows. Namely privatization, more open market and rules protecting competition should encourage FDI inflow and ensure that benefits in form of technological spillover or productivity increase can be exploit entirely. Another structural factor that should help all companies in economy is advanced financial market wide and deep enough to provide sufficient support to all companies. Last but not leas the tax structure can also matter. According to recent analyses countries should equalized and lower overall tax burden for all companies in the economy rather than go the way of subsidies targeted to foreign investors.

The inward FDI has many positive impacts on host country economy. Theoretical considerations about FDI suggest that FDI should possess different technologies and so that entry of foreign firms should stimulate technological upgrade by domes-

tic firms. The empirical studies confirm these suggestions for "middle" developed countries with high enough level of education and low enough level of corruption. More specifically the studies confirm that presence of foreign firms is connected with change in production functions of domestic firms toward more capital intensive functions. This change in production functions may reflect better technologies brought in by foreign firms, as well as their increased willingness to outsource more sophisticated parts to local producers (Tytell & Yudaeva, 2006). The other way how host country economy can benefit from inward FDI is increase in competition. This increase usually brings higher productivity not because of new technologies but also because of increase productivity of domestic workers, increased activity of people and may be due to better organization of production process. So it means that inward FDI helps increase the quality of host country's human capital and also it can motivate to improve the quality of corporate governance. Last but not least, the inward FDI is linked with inflow of physical capital to the host country. There are two ways how the host country can benefit from it. The inflow of capital to the economy generally enhances its productive capacity and so it increases also its growth rate. According empirical study of Johnson (2006) the effect is bigger for countries with a low capital-labour ratio than for countries with extensive capital stock. This phenomenon is caused by decreasing marginal productivity of capital. If there is enough capital stock in the economy the positive effect of FDI on growth is not so significant. Another way how host country's economy benefits from capital inflow caused by inward FDI depends on its specific feature. The FDI capital inflow is the least vulnerable form of capital flows and thus it makes countries less vulnerable to sudden stop or reversal of flows (Kose et al., 2006). It means that the economy is more stable and so the business risk decrease, which is beneficial for all firms in the economy.

## **2.1 History of politics toward FDI**

At first in 1980s and early 1990s FDI as whole and specifically inward FDI was quite controversial. While some people considered them beneficial, other people concern about such things as loss of national sovereignty, threats connecting with national security or increasing influence of foreign investors to politics. Because of these alleged threats there were many restriction put to FDI. From 1980s the trend leads to increase liberalization in this area. The benefits from FDI overweighted the possible threats finally in the second half of 1990s and in 2000s and so the policy-makers around the world try to attract them by various measures.

One way how to attract more FDI is to offer some incentives to foreign firms, as for example tax "holidays" or special conditions for their employees. However this way is far from being optimal. Various studies suggest that special incentives for foreign firms are likely support negative influence of FDI to the host country's economy. For example when a foreign firm gets tax holidays their costs of production decrease in comparison with standard situation and so they have advantage over the domestic firms. This leads to the conclusion that in case of tax holidays the crowding-out of domestic firms from the market is more probable. It is in line with findings of Golub (2003). Overall economic analysis, used in his paper, suggests that the appropriate policy toward FDI is usually neutrality between domestic and foreign firms. He additionally explain that neutrality means mainly two things: there should not be obstacles to foreign green-field investment, mergers or acquisitions and also the national treatment should be guarantee to them – they should not be discriminated when conducting the firm. In other words the politics should neither discriminate the foreign companies not to favour them. It follows that policy makers should cancel restriction put on inward FDI and on the other hand they should not offer incentives to foreign investors. So now the question is what are the other possibilities how to attract FDI in a situation when we cannot favour them. Does liberalized markets itself attract FDI? And if so which markets should be liberalized in order to attract FDI to a particular industry? The analysis should answer these questions.

# Chapter 3

## Determinants of FDI

Generally we can divide determinants of FDI to three groups: economic conditions, host country policies and strategies of multinational firms. Furthermore we can divide each of these three groups to various sub-groups. There are three sub-groups for economic conditions: market linked, resources linked and competitiveness linked determinants of FDI. Among market-linked determinants belong such characteristics as market size, income level, urbanization, stability and growth prospects, access to regional markets and demand pattern. All of these determinants are rigid enough so we can conclude that at least in short-run they are exogenous to host country. Moreover it is quite hard to influence them even in long-run, mainly because we do not know how. The second sub-group consists of natural determinants as natural resources and location. These determinants are given and host country cannot influence them. Under the competitiveness label there are determinants as labour availability, costs, skill; managerial technical skills, access to inputs, physical infrastructure, supplier base and technological support. Some of these determinants can be influenced by structural reforms. For example more flexible contracts can decrease the costs of labour or product market reforms can simplify the access to inputs.

The second group of determinants – host country policies consists of four sub-groups: macro policies, private sector policies, trade and industry and FDI policies. Management of crucial macro variables, ease of remittance and access to foreign exchange are included in macro policies sub-group. The macro policies influence mostly the stability of host state economy and so the business risk depends on them. To the second sub-group: private sector policies belongs promotion of private ownership, clear and stable policies, easy entry/exit policies or efficient financial markets. These determinants affect stability of the economy but also the cost of establishing and conducting business. Trade and industry policies subgroup consists of trade strategy, regional integration and access to the markets, ownership controls, competition

policies and support for higher integration of various markets (for example Single European Market in Europe). These policies aim to expand market by liberalization and integration. There is a rule that bigger market attracts more FDI so if the market is integrated enough it can be considered as one big market and thus even small countries can capture more FDI. The last sub-group represents policies precisely focused on FDI. Among them I want mentioned ease of entry, ownership incentives, access to inputs or transparent and stable policies. It is quite clear that these policies coincide with some above mentioned. Their aim is higher stability and transparency and thus lower business risk and lower costs of establishing business. The additional are only the ownership incentives, which should attract investor by direct promise of some advantages. This policy is quite controversial because it favours foreign firms and discriminate the domestic in the same sector so some economist do not consider it beneficial.

The last group concerns strategies of multinational enterprises. More closely the strategies can be divided to two sub-groups: risk perception and location, sourcing, integration transfer. The host country risk perception is based on political factors, macro management, labour markets and policy stability. The lower risk means higher chance that the particular company decides to invest in the host country. As I discussed above there are quite a lot of circumstances that influence the level of host country risk. Other strategies of the multinational enterprise which consider invest to host country that matter are company strategies on location, sourcing of products/inputs, integration of affiliates, strategic alliance, training and technologies. These last determinants cannot be influenced by host country. They are strategic decisions make by the investors but I mentioned them here to complete the list of determinant of FDI.

I described exhaustive list of determinants of inward FDI above. But there is too much determinants and some of them cover the same idea only from different point of view. To analyse them I need to choose the most important and also I need to find good numerical representation for them. Historically one of the most important determinants of FDI location was the size of the market. The size of the host country market is usually measured by its GDP. This determinant should still be one of the most important although some recent studies argue that with promoting of globalization this determinant loose its weight. In their opinion the globalization means better integration of various markets and when there are not any restrictions in the borders it is not so important where the firm establishes the production capacity. Therefore I decided do not include GDP to my analysis and I rather use logarithm of GDP per capita to approximate market size. Logarithm of

GDP per capita is widely used in the FDI determinant literature and it is nearly always found to be positive and significant. It represents the size of market in economic sense. It means that if we use just GDP it could lead us to the conclusion that highly populated but poor country has big market. It need not to be the case as people with very low income cannot afford to buy so many products. In this sense the small country with less but rich people can in fact represent much larger market.

The second macroeconomic variable I decided to include is real GDP growth. Higher real GDP growth should attract more FDI inflows because it means opportunity to participate in economic growth of the host country and possibly to obtain higher returns to the investment. This relationship is very straightforward and so it is immediately clear that the real GDP growth should have positive sign.

Another explanatory macroeconomic variable I use in my analysis is inflation. This variable represents the stability of the economy. The intuition is that more stable economy means lower risk for the foreign investors and so they are more willing to invest. In fact lower risk imply higher expected return so the investment should be more profitable. Therefore the expected sign for this variable is positive.

I decided include also exchange rate to my analysis. There are several mechanisms how exchange rate can influence the FDI inflows. I mention just two of the mechanisms. Firstly if the inflows are motivated by acquisition of assets that are transferable within a company across many markets without a currency transaction then an exchange rate appreciation of the foreign currency lower the price of the asset in that foreign currency, but does not necessarily lower the nominal returns. This reasoning suggests that the sign for exchange rate should be positive. The other way how exchange rate can influence the FDI inflows is explained within imperfect capital markets model, where internal cost of capital is lower than borrowing from external sources. Then the depreciation of the host currency leads to increased investor's firm wealth and provides it with greater low-cost funds to invest to host country, where depreciation occurred (Blonigen, 2005). In this case the expected sign is negative.

There are basically two reasons why to include trade openness as an explanatory variable. The first is that "open" economies encourage more confident and so foreigners are more willing invest there. The second reason is that foreign firms are usually export oriented and so more "open" economy is more suitable for them and offer them easily accessible large market (Singh & Jun, 1996).

### **3.1 Inward FDI and structural reforms**

The structural reforms influence FDI by two ways. They stimulate the quantity of FDI and moreover they increase benefits from FDI for host country. The structural reforms can increase quantity of FDI by two ways: at first they can liberalize some part of economy and so the foreign firms are allowed to establish they affiliate or acquire some firm in host state or the access to the host country market is easier. The second way how they influence quantity is that some structural reforms can alter the legal conditions or in such manner that it is easier and less risky to conduct firm in host country. It can for example simplify the access to the loans, simplify the hiring of employees as the more flexible work contracts are available or it can make legal system more transparent. The structural reforms also increase benefits which country obtains from FDI by various ways. For example they increase the absorptive capacity of FDI in host country. It means that there is higher technology transfer from foreign firms to domestic firms or it increase human capacity – people acquire more experiences.

Despite the above mentioned facts, there are not many studies which analysed the influence of structural reforms on FDI. The main reason for the lack of studies of this type is that there is the scarcity of data which would be comparable across countries and regions. One of the exceptions is work by Campos & Kinoshita (2008), which explore the effect privatization, level of development and quality of the infrastructure on the FDI in 19 Latin American and 25 transition economies from 1989 to 2003. They found that there is "a robust empirical relationship from structural reforms to FDI".

### **3.2 Selection of Countries and Industries**

Selection of data set's countries is not random. While some empirical studies presuppose that there should be the same set of FDI determinants for all countries, the others show that there are certain differences. For example Eichner et al. (2012) finds evidence that FDI determinants for developed and developing countries differ. It seem that as a country approaches certain level of development some determinants, for example military influence in governance or common language, are not significant any more and on the contrary there are others which start to be significant as for example market size or productivity. I decide to work with set of developed countries. More specifically my dataset contains 31 European and outside-Europe developed countries, all of them are OECD members (Australia, Austria, Belgium, Canada,

Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and the United States). The choice of OECD members or developed countries to create data set has various advantages. Firstly the advanced countries seems to be quite homogeneous group at least in terms of FDI determinants on industry level. The second advantage is that OECD member or advanced countries are the largest homogeneous group of countries for which FDI data are available. They also account for as much as 65 % of world's total FDI inflows (UNCTAD (2012), average for examined period). The large set of individual countries is particularly important for me because I use Difference GMM model to explore the data and the more individual countries I have the better model performance is (designed for large individual dimension, small time dimension). In third place developed countries usually provide wider range and more detailed statistics of macroeconomic variables than less developed ones, which helps me to obtain complete set of explanatory variables.

Concerning industries I chose seven for my study. Although the FDI flows dataset contains 65 industries or groups of industries I decide to use just seven broader categories. I started with two representatives of primary sector: Agriculture and Mining. Then I selected Manufacturing and Electric Industry belonging to the secondary sector and Telecommunication, Transportation and Financial Services from tertiary sector. There are two main motivation for this choice. In the first place I selected two representatives from each sector, beside tertiary for which I choose three representatives. It enables me explore not just determinants of each industry but also to see if primary, secondary and tertiary sectors are homogeneous in terms of FDI determinants. Secondly I chose particularly Electric Industry, Telecommunication, Transportation and Financial Services because these industries liberalize dramatically during observed period (1994-2009) nearly in all developed countries. This fact gives me good ground for analysis of impact of liberalization on the FDI inflows. I presuppose that liberalization should be significant determinant of FDI flows and that release of regulation should bring more investments the industry.

# Chapter 4

## Data set

My dataset covers 31 countries and seven industries observed during fifteen years from 1994 to 2009. The dependent variable is net FDI inflows divided by GDP. The explanatory variables are split into two groups to macroeconomic and qualitative variables. GDP per capita, GDP growth, real effective exchange rate (REER), inflation rate represented by CPI, FDI stock and openness represent the macroeconomic variables. The main data-source for macroeconomic variables as well as for FDI flows is OECD statistical database (OECD, 2012). Considering qualitative variables my dataset consists of labour market flexibility index, industry level regulation index, rule of law, political stability and taxation level. The main source of information about qualitative variable is World Bank database (World Bank, 2012), especially its part dedicated to World Development Indicators. All variables are described below in more details.

### 4.1 Foreign Direct Investment

Data on net FDI inflows, used in this study, are from OECD International Direct Investment Database (OECD, 2012). They are presented in millions of USD and inward FDI is defined there as "the objective of obtaining a lasting interest (ten percent or more of voting stock) by a resident entity in one economy in an entity resident in an economy other than that of the investor" in my dataset. The requirement of obtaining lasting interest for investment to be classified as FDI is crucial in sense that it determines the main features of FDI. This particular condition assures a long term relationship between the investor and the target enterprise and a significant degree of influence on management of target enterprise. It makes FDI more stable than other types of investment and also more influential and thus important for an economy. I defined the inward FDI but I should also explain what

exactly net FDI inflow means. Net FDI inflow does not capture just the initial transaction between investor and target enterprise. Moreover it incorporates also all subsequent capital transactions between investor entity and target company and among affiliated enterprises, both incorporated and unincorporated. This definition is substantial because it explains why net FDI flows reach both positive as well as negative values. As I mentioned above my dataset consists of seven industries. The industry classification for net FDI inflow is according to the industry of the host company, which is suitable for my intention to explore FDI determinants from host country point of view. I briefly describe evolution of net FDI flows to each sector and industry worldwide and in developed countries below.

#### **4.1.1 Primary sector**

I start with primary sector, which was not so important FDI target in the first years of the examined period, but which have experienced revival in past few years. Whole primary sector accounted for 5% of total Mergers and Acquisitions sale in the first years of the observed period, but its share increased to more than 10% in recent years. These numbers illustrate substantial increase in investment in mining and quarry in recent years. There are two reasons for described pattern. The first reason is the increase in prices of natural resources and the second reason explaining the increase in share of total investment is the worse impact of crisis on the two other sectors. I look into both reasons in more details in next paragraphs.

Inflows to Agriculture and Fishing are first industry inflows I examined. The worldwide data suggest that countries with large territories, such as Australia, Canada or the United States are hosts to significant levels of inward FDI inflows in agriculture (UNCTAD, 2009). Other important recipients are mainly developed countries: various EU members as for example France, Poland, the United Kingdom, Hungary and Italy and also countries outside Europe like Turkey or Republic of Korea. Most of FDI inflows to agriculture in developed countries has concentrated on cash crops such as fruits, vegetables and flowers, and on animal products like meat, poultry and dairy. On the contrary inflows to developing countries concentrate mainly on production of rice, sugar cane, soya beans or wheat. The distinct pattern of FDI flows to developing and developed countries can indicate differences also in FDI determinants for each group of countries. So my dataset is focused on net FDI inflows to agriculture to developed countries only. Nevertheless there apply similar trend as for worldwide data, for example the biggest FDI inflows from my dataset occurred in USA, Italy, Poland, France, Hungary Chile and Mexico, which are all countries with huge territories. Agricultural FDI inflows to developed

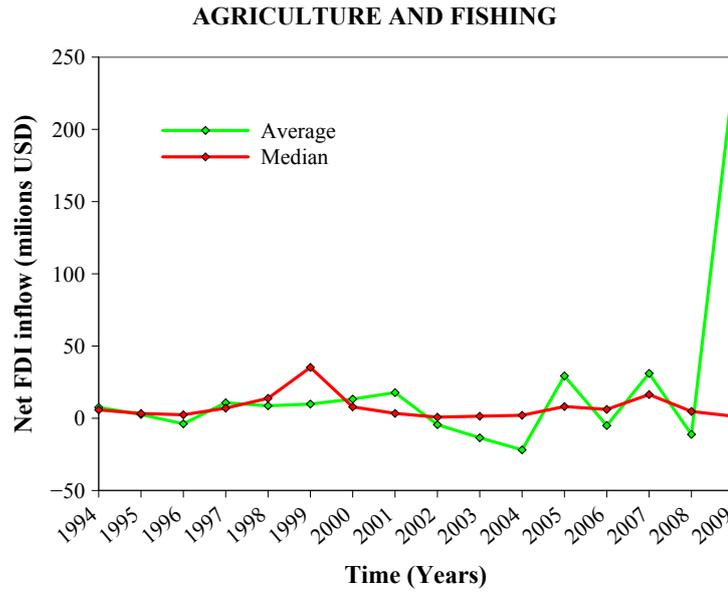


Figure 4.1: Average and Median Net FDI Flows to Agriculture and Fishing for Developed Countries. Source: Author's computations

countries increased through observed period slightly. See figure 4.1 The figure show average and median investment in observed countries for each year from examined period. As you can see there is median investment values peak in 1999 and in 2007 and there are three peaks in average investment values, concretely for years: 2005, 2007 and 2009. While average peaks can be driven by high FDI flow to one country only - which is the case of 2009 peak driven by extraordinary high inflow to Norway, the median peak can be driven just by many positive and few negative flows. Considering both I judge that net FDI flows to agriculture for all developed countries were the highest in 2007, which is consistent with FDI inflows boom in many other industries. Slight drop after 2007 was caused by economic crisis and as I mentioned above the average peak in 2009 was driven just by exceptional value for Norway and the flows to other countries dropped, which is clearly visible in median investment value decrease.

Although it seemed in mid 1990s that huge investments to mining and quarrying belonged to past, the sharp increase in prices of mineral resources completely change the picture. The prices of mineral resource increased dramatically during past twelve years because of sharp rise in demand of fast-growing Asian markets, which added its demand to stable high levels of demand in developed countries. For example in 2006, the price of crude oil was ten fold in comparison with its lowest point in 1998. Price increases have also occurred in metals such as aluminium, copper, nickel and zinc,

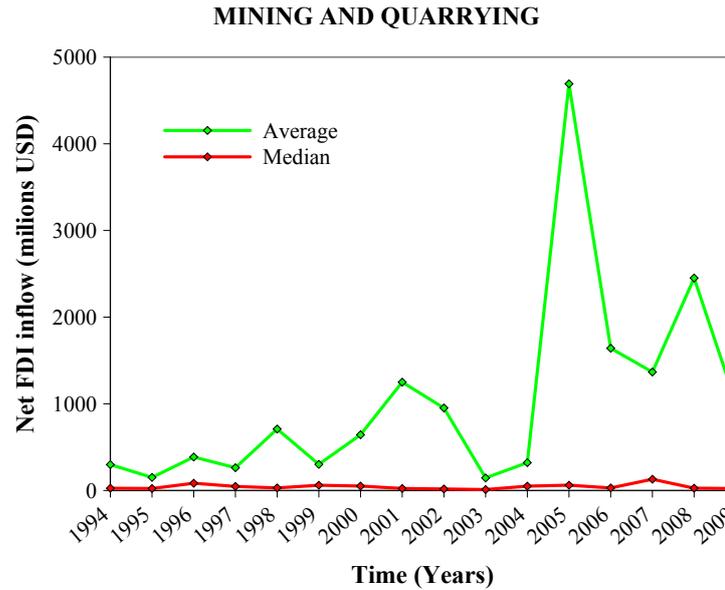


Figure 4.2: Average and Median Net FDI Flows to Mining and Quarrying for Developed Countries. Source: Author’s computations

and by June 2007 they were far higher than the levels prevailing in 2003. As a result, corporate profits in the extractive industries have soared and international investments have rebounded (UNCTAD, 2007). Concerning developed countries mining and quarrying is more important in terms of outward FDI as consumption of raw material is much higher than production in these countries. Nevertheless some developed countries received quite large FDI inflows to this industry in recent years and these flows can even account for substantial part of total FDI inflows in these particular countries. The biggest FDI recipients for mining and quarrying were USA, the United Kingdom, Canada and Australia. Concerning the share of mining and quarrying FDI inflows on total inflows they are very important for some years. For example In 2003, 38.98 percent of total FDI flows into Australia were attributable to the mining and quarrying sector or in 2005 mining and quarry reached share nearly 60% of total inflows to the United Kingdom. USA peak was in 2002 when share of mining FDI on total investment inflows accounted for 14 %. To explore situation in all developed countries see figure 4.2 presenting the average and median investments to mining and quarry for observed countries. There are three peak in average investment values, which can be all attributed to boom in one country of the biggest recipients. 2001 peak is due to huge investment to Canada, 2005 peak is caused by FDI inflow boom in United Kingdom and 2008 peak is influenced by enormous investments to Australia. Thus to capture situation in all countries it is

better to judge only from median investment value for mining and quarry industry. The median investment value peak occurred in 2007, the same year as in agriculture.

### 4.1.2 Secondary sector

At the beginning of the observed period secondary sector accounted for more than 54% of total Mergers and Acquisition sales, but its share decreased in favour of third sector to approximately 35% in recent years. However it does not mean that investments in manufacturing decreased in absolute values. On the contrary in absolute terms the investments were increasing till 2007, when they were fourfold comparing with 1994 value. The reason for lower investments in secondary sector is mainly high degree of internationalization.

The fact that manufacturing accounted for nearly one third of estimated world inward FDI in period 2008 and that the majority of the largest transnational corporations (TNCs) continue to be from manufacturing industry, show that this industry is still very important investment target. Concerning developed countries manufacturing is far more important than agriculture or mining. While just five from 31 countries reached or exceeded level of 1 billion USD in average and median, but not so important as services nowadays. The biggest FDI inflows received the United Kingdom, Mexico, France, the Netherlands, the USA and Italy during observed period. I also use the figure with average and median investments of all observed countries for manufacturing See figure 4.3 The evolution in net FDI inflows to manufacturing is interesting by non-increasing value of average investments, which is quite unique pattern. There are two distant peaks for average investments with about the same value on the figure 4.3. The similar pattern apply also to median investment values. The second peak occurred in 2008, which is one year later than in other industries. This shift in peak was probably caused by expansionary fiscal policy targeted mainly on manufacturing during the first years of economic crisis, which postponed the impact of economic downturn on manufacturing.

The second industry belonging to secondary sector include Electricity, Gas and Water production and is called energy industry from now on. This industry went by opposite way than manufacturing it started with about zero share on total FDI inflows and then this share rose quite steadily through 1990s till 2006 when share of energy industry accounted for 2% of total FDI inflows. In absolute values the FDI flows to energy industry increased eightfold in eleven year period from 1995 to 2006. There are two main reason for observed increase: firstly it liberalization and privatization of energy industry in many countries in observed period and the second reason is increasing demand. Considering developed countries FDI to energy industry

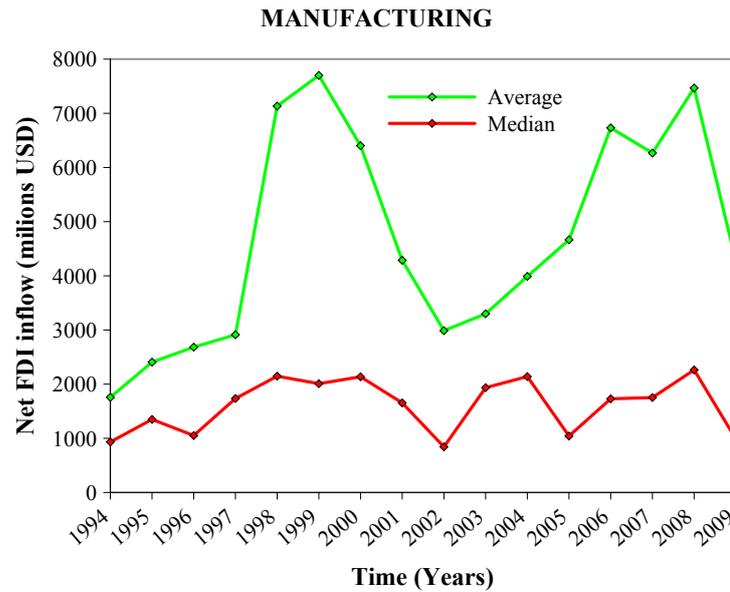


Figure 4.3: Average and Median Net FDI Flows to Manufacturing for Developed Countries. Source: Author’s computations

accounted for nearly 8% of total FDI inflows between 2005 and 2007, but its share on total inflows in the beginning of observed period was substantially lower. There are typically missing or zero values for the first years of my dataset as, at least some parts, of energy industry was quite heavily regulated in many developed countries. The biggest FDI inflows went to the United Kingdom, the United States, Sweden, Italy, Spain and Belgium during the period from 1994 to 2009. See summary statistic - average and median investments to energy industry on figure 4.4 As the figure 4.4 shows the energy industry reached its highest values of FDI inflows between 2007 and 2009. Comparing energy industry in manufacturing the main difference is in increase trend in average investments and may be also in median investment, although the trend is not so clearly visible there, to energy industry. Also the cyclical downturns and upsurges seem to be delayed a little. However there is clear peak for median investment for both in 2008.

### 4.1.3 Tertiary sector

The tertiary sector - services has become more and more important in recent years, which is visible on its share on total investment flows. While share of investments to tertiary sector on estimated world FDI stock was just 49% in 1990 grew to 62% in 2006 (UNCTAD, 2008). So now investments to tertiary sector represent the biggest part of total FDI. The presence of companies from the services sector in the list of

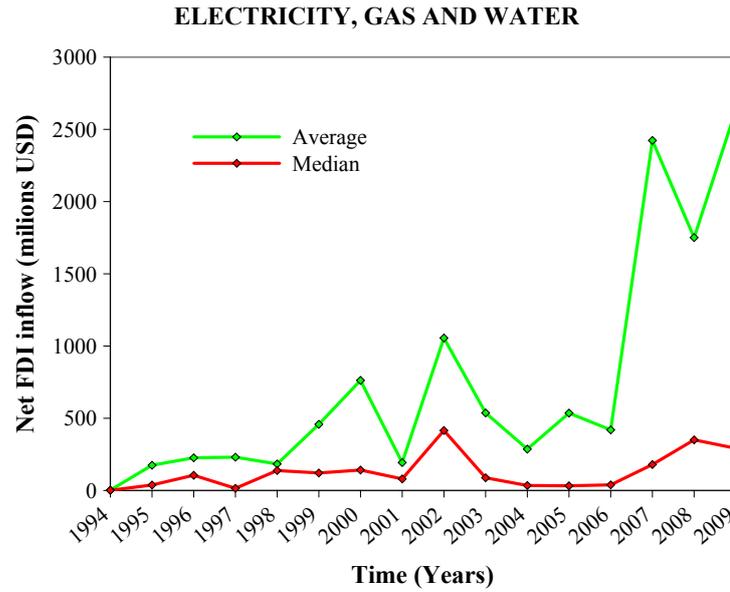


Figure 4.4: Average and Median Net FDI Flows to Electricity, Gas and Water for Developed Countries. Source: Author’s computations

the top 100 has continued to increase: from 14 in 1991 to 24 in 1998 and finally to 26 in 2007. Due to the high importance of tertiary sector for FDI I chose and described below three industries belonging to this sector.

There is one industry with exceptionally high FDI flows in tertiary sector - financial services or sometimes also called financial intermediation. FDI flows to financial services worldwide increased substantially after 2001, as a result of deregulation and globalization. The financial companies needed to explore the economies of scale, which would enable them to be more competitive in their home market due to lower costs. They also wanted to gain more market power, which would give them necessary financial strength to be able to conform to the new regulatory agreement (Basel II) or they found attractive the decrease of volatility of risk due to geographical diversification. The main target of FDI to financial sector were United Kingdom, United States, China, Singapore, Brazil, Mexico and Poland from 2001 on (UNCTAD, 2008). Considering my dataset of developed countries, the net FDI inflows to financial intermediation were quite consistent in observed period in sense that the median and average investments to this industry achieved its maximum values in the same years, as you can see in figure 4.5 It means that the flows are quite evenly distributed among developed countries and there are not many excess values in this part of dataset. The increasing trend in values of net FDI flows to financial services is clearly visible in figure 4.5 as well as two peaks, the first, lower in 2000 and the

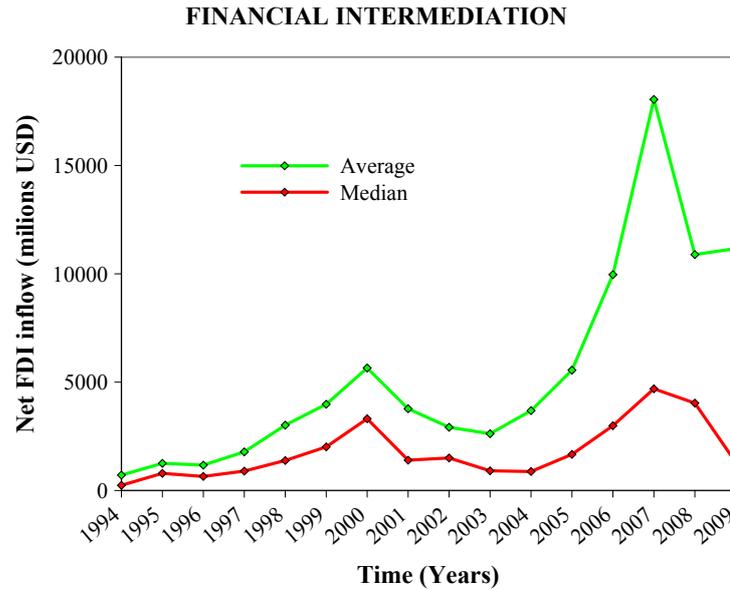


Figure 4.5: Average and Median Net FDI Flows to Financial Intermediation for Developed Countries. Source: Author’s computations

second much higher in 2007. The second peak in 2007 went along with worldwide trend where maximum value in 2007 is followed by sharp decrease in 2008 and 2009. As I mentioned above the similar pattern is followed also by agriculture and mining industry.

The second industry from tertiary sector I want to describe is telecommunications. Evolution in inflows to this industry has similar pattern as evolution in transportation industry described below, at least at first half of observed period. In early 1990s the FDI inflows to telecommunications worldwide experienced big boom due to extent liberalization of the industry and also due to technological progress which moved industry from natural monopoly to competitive one and also it facilitated access to new markets where infrastructure needed to be build. However after peak in 2001 the FDI inflows to the industry decrease substantially and it stagnated till 2009. FDI inflows to telecommunications rose slightly in 2009 as they were protected by resilient demand and by lower internalization than in other sector. FDI inflows to telecommunications in developed countries followed worldwide trends. It is clearly visible in figure 4.6 The FDI inflows to telecommunications to observed countries reached the highest values in 1999 for average investment and in 2000 for median investment. Then both average and median investments went down and they reached bottom in 2003. Slight revival in 2004-2006 period was superseded by another downturn and the FDI inflows to telecommunications reached the bottom

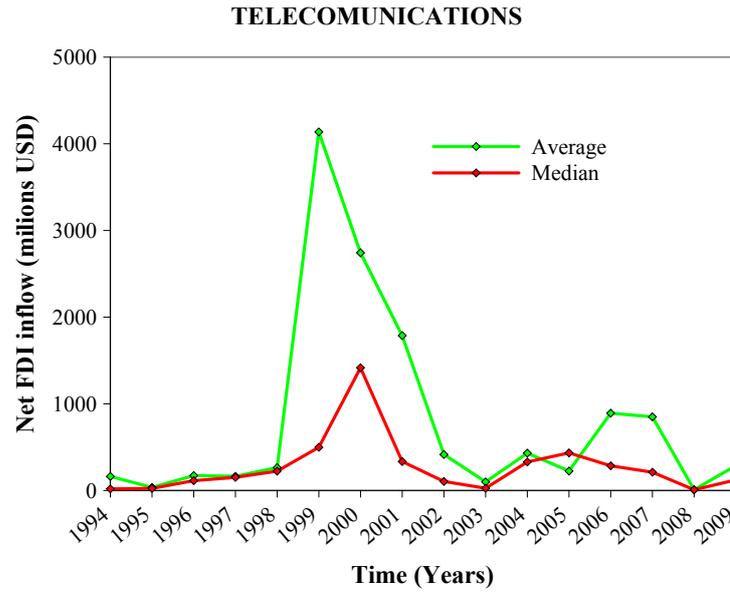


Figure 4.6: Average and Median Net FDI Flows to Telecommunications for Developed Countries. Source: Author's computations

again in 2008. The subsequent mild recovery in 2009 followed the worldwide trends.

The last examined industry is Transport, Storage and Communication industry, shortly transport industry or transportation. Transportation belong to the same group of infrastructure industries as telecommunication and so their evolution is similar for some periods. FDI flows to transport industry worldwide started to growth in 1990s and its value increase more than thirty fold to 96 392 millions of USD between 1989 and 2007 (UNCTAD, 2009). The rapid growth was reflected also in the share of FDI to transportation on total FDI, which grew from less than 2% in early 1990s to its maximum value of 7% in 2000, but then the share decreased slightly to 6% of total world FDI in 2006 (UNCTAD, 2008). The evolution of net FDI flows to transportation to developed countries differ from worldwide evolution slightly. As you can see in figure 4.7 there is the peak for median investment and high value for average investment in 2000, which correspond with worldwide trend, but then the cyclical pattern prevailed in median investment evolution for period 2002 - 2007. After 2007 the net FDI flows to transport industry went down for both average and median inflows to developed countries. Here net FDI flows to telecommunication and transportation to developed countries differ. The difference is caused by higher degree of internationalization in transport industry.

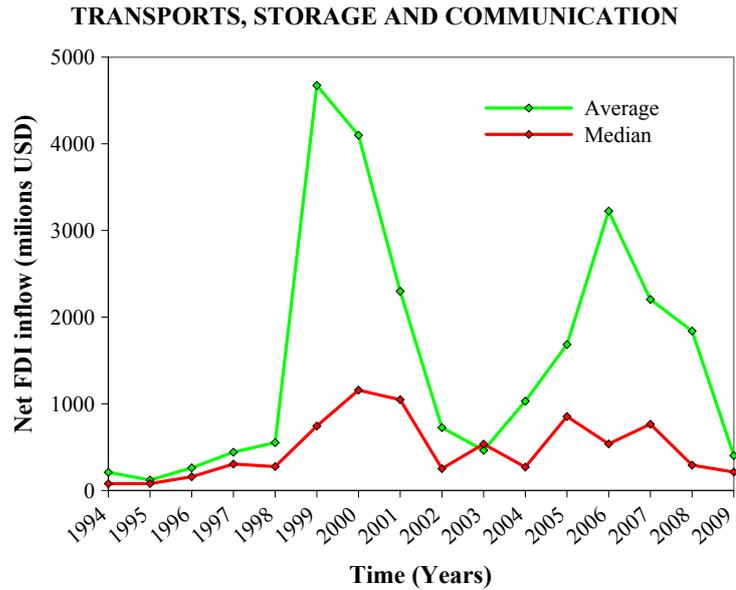


Figure 4.7: Average and Median Net FDI Flows to Transport, Storage and Communication for Developed Countries. Source: Author’s computations

## 4.2 Macroeconomic Variables

This section briefly discuss the macroeconomic variables. It is much shorter than the following one, which describes qualitative variables, because macroeconomic variables I use have all standard - widely recognized - definition and usually also the way how they are calculated so its more clear how they influence the results. All macroeconomic variables used for regression are from various parts of OECD statistical database (OECD, 2012).

The first of macroeconomic variables is GDP per capita, calculated by expenditure approach. The units are USD quoted in current prices and Purchasing Power Parities (PPPs). The second macroeconomic variable is GDP growth, which is represented by annual percentage growth rate of GDP at market prices based on constant local currency (base year 2000). To measure inflation I use Consumer Price Indices (CPIs), which capture the average changes in the prices of consumer goods and services purchased by households. The base year is for this index the year 2004 and the source of data is OECD statistical database (OECD, 2012) as in previous cases. The long term interest rate is also from OECD statistical database (OECD, 2012), where 10 year government bonds yields are used as reference rate. Unlike the previous macroeconomic variables real exchange rate (REER) comes from World Bank statistical database (World Bank, 2012). It is defined there as a measure of the value of a currency against a weighted average of several foreign currencies divided

by a price deflator or index of costs. The base year is 2005. The last macroeconomic variable I included is openness. The openness is represented by trade to GDP ratio, which is quoted in Constant prices, constant exchange rates, the base year for the constant prices is 2000. The source of data is once more OECD statistical database (OECD, 2012).

### **4.3 Qualitative Variables**

I describe all qualitative variables in detail in this section. I believe that is important to know how the qualitative variables are defined exactly and how they were created because there is usually no widely accepted definition for them neither the widely accepted way how to construct them. Their definition play important role in result interpretation and way how their are constructed influence the result itself so if you do not know it you cannot compare results from different papers. I decided to use variables created by various well established organization rather then create my own (with exception of Financial market depth) mainly because the indicators I used are easily accessible so anybody can recreate the results.

#### **4.3.1 Labour Market Liberalization Indicators**

I use index of employment protection constructed by OECD (OECD, 2012) as the indicator of labour market liberalization. The index measures the strictness of regulation on regular contracts and it consists of three groups of sub-indicators: procedural inconveniences, notice and severance pay for no-fault individual dismissals and difficulty of dismissals. All three sub-indicators rank from 0 to 6 and they are weighted equally. The index also rank from 0 to 6, where 0 means no restrictions and 6 represents absolutely regulated market. Thus I expect the minus sign for this variable in my regression as lower value of the index (higher liberalization) should attract more FDI inflows.

#### **4.3.2 Product Market Liberalization Indicators**

To cover a topic of liberalization I use OECD indicators of regulation for product markets and services markets (OECD, 2012), which map anticompetitive barriers inside of each industry I explore, beside manufacturing. Each indicator consists of four sub-indicators: the first measures entry barriers, the second describes control inside targeted industry, the third maps involvement in business operation and the fourth address the market structure. The indicators are based on rules, regulations

and market condition so they are so called "objective" indicators as opposed to survey-based. Moreover the indicators take into account just regulations that restrict efficiency-enhancing competition and it omits regulation in areas in which competition would not lead to efficient output. It means that the indicators are focus on judging quality of regulation with respect to competition only. All the indicators are constructed as followed: In the first step the basic information is coded into quantitative scale, where higher number means higher restriction to competition. Then the basic coded information is aggregated into sub-indicators, that cover specific area of regulation. At the end the sub-indicators are aggregated into an overall indicator of regulation for the sector (Conway & Nicoletti, 2006). The following paragraphs describe in detail history of regulation in each industry and composition of each indicator.

Despite the reform effort in past decade the energy industry remains still highly regulated in some countries. The main problems are high level of public ownership and vertical integration in such countries as Switzerland, Canada, France, Greece and Ireland. On the other hand countries like the United Kingdom, the United States, Sweden, Finland, Germany, Austria, Spain or Italy have adopted significant reforms successfully at least in electricity segment of energy industry. The composition of the regulation indicator reflect high level of regulation especially in gas segment. It consists of four sub-indicators which map: entry regulation, public ownership, vertical integration and market structure. Entry regulation sub-indicator assess regulation of the third party access, regulation of consumer choice, degree of liberalization of wholesale power market and finally degree of limitation of access to production or import market for gas is also take in consideration. Sub-indicator for public ownership capture the prevailing ownership structure in various segments of the industry. Vertical integration sub-indicator maps the degree to which competitive activities are separated from natural monopoly activities (anticompetitive behaviour is assumed when a company simultaneously control the network and operate also in competitive market). Finally the sub-indicator of market structure observe the market share of the largest companies in various segments of the industry. This sub-indicator tell us, to some extent, how successful the regulatory framework was in moderating the market power incumbents.

Regulation level inside transport industry is quite heterogeneous. While road freight was extensively liberalised by the mid-1990s nearly in all observed countries, the railway industry continues to be characterized by high level of public ownership and vertical integration. The air transport services lay between these two segments concerning regulation. Despite the reforms adopted the competitive pressure often

remains low especially in international air routes, where restrictive bilateral air service agreements and limits to foreign ownership of national carriers still apply. This heterogeneity in regulation is reflected in construction of sub-indicators for energy regulation indicator. They are created with regard to specific features of each segment. Entry regulation sub-indicator for rail transport services distinguishes three types of entry mode: free entry, franchising to several firms and franchising to a single company. The same sub-indicator for air transport services observes the liberalization of internal routes and also participation in agreements liberalising international access to routes. These two aspects are weighted by the share of domestic passengers. Concerning road freight the barriers the entry are not so substantial. The entry sub-indicator for road freight thus covers just the level of intervention of incumbents in decision concerning entry or price setting and asks if the licensing system is restrictive or discretionary. The second, public ownership sub-indicator covers just rail and air transport, because observed countries do not have any relevant stake in road freight. For both rail and air transport it reports the percentage shares owned by government in the largest company. The last two sub-indicators - vertical indicator and market structure indicator are calculate only for rail transport services. The vertical sub-indicator here maps the degree to which competitive activities are separated from natural monopoly activities as well as in case of energy industry. Market structure indicator distinguish between franchising to several companies in several separate markets and in one market (in the first case firms are local monopolies, in the second they are competing each other on the same territory).

The telecommunication industry was widely deregulated in the second half of 1990s in Europe, reflecting European Union liberalization directives. Nowadays restrictions to entry are uniformly low across EU countries but also other observed countries, where deregulation started in mid 1980s. The substantial differences still remain only in degree of public ownership and market structure across countries. These facts suggest that telecommunication industry is more open than energy or transport industry, which is also reflected by he structure of regulation indicator for telecommunication. The indicator consists of three sub-indicators: entry regulation, public ownership and market structure sub-indicator. Entry regulation sub-indicator measures level of legal limitation on the number of competitors allowed in each of the post and telecommunication markets. The results are then weighted with the share of turnover generated in the average OECD country by each segment. The second indicator - public ownership refers to the extent of government control in various segments of the industry. The the results are weighted by the same way as in previous case. The last sub-indicator is market structure, which quantify the

market share of new entrants in each segment. It evaluates to some extent how existing regulation is successful in promoting competition as well as in case of other industries.

### **4.3.3 Tax indicators**

There are two aspects of tax policy concerning FDI. The first is level of corporation tax applying for all firms in the particular country and the second are tax incentives, offered to foreign investors, which apply only to limited number of firms. Sometimes even to limited number of foreign firms. At first I should decide which of these two aspects I incorporate into my indicators. As there are concerns, supported by recent literature, that subsidies lower the positive externalities from FDI inflow to the economy, I choose to explore just the tax levels relevant for all firms in the country. I use taxes on income, profits and capital gains as percentage of GDP in my analysis. This data come from OECD statistic database (OECD, 2012). As lower taxation should encourage the FDI inflows I expect negative sign for this variable in my analysis.

### **4.3.4 Control of Corruption and Rule of Law Indicators**

Control of Corruption and Rule of Law indicators belong to series of The Worldwide Governance Indicators (WGI) published by The World Bank (World Bank, 2012) as a long standing research project to develop cross country indicators of governance. Unlike regulation indicators above, these two indicators are survey-based. It means that they rely exclusively on perceptions-based or subjective measures provided by various surveys. Large variety of data sources used for construction of these indicators ensure that they reflect opinions of a very diverse group of respondents. They reflect opinion of individuals or households as well as expert assessments produced by various organizations. The subjective nature of these indicators is advantageous in many ways. First of all people based their decisions on perceptions, impressions and their own opinions, which is the basis for decision making at least in areas as corruption or faith in legal system. The second advantage is that survey-based analysis can capture even the fields where fact-based analysis fails because the data available are biased or they are not available at all. In another words objective data may capture formal rules and restrictions, but they tell us nothing about how and even if these rules are enforced. So it could happen that two countries having the same formal rules in reality differ substantially in level of corruption or trust in legal system because the rules and laws are enforcement distinctly. Despite all these

advantages one might argue that survey based data are imprecise, that the extent to which they capture the relevant reality is uncertain. Nevertheless this problem is targeted by using proper empirical methods when constructing the indicators. Concretely Kaufmann et al. (2010) use of Unobserved Components Model (UCM) to extract relevant information from various survey-based data should help to objectify the data. The basic idea of this model is that each of the individual data source provides an imperfect signal of some deeper underlying characteristic that is difficult to observe directly. So the model is designed to extract the unobserved component common to each individual data source under the assumption that the only reason why two sources might be correlated with each other is that they are both measuring the same underlying unobserved characteristic. Thus I explained how indicators were made and now I describe briefly what each of them capture.

I start with the Control of Corruption indicator. It monitors how people perceive the extent to which public power is exercised for private gain and extent to which state is controlled by elites and private interests. The indicator range from zero to one where one means the best outcomes - the lowest value of corruption, while zero means the worst possible level of corruption. So I expect this variable to have positive sign as lower level of corruption should attract more FDI inflows.

Rule of Law indicator describes the extent to which people have confidence in rules of society and comply with law. It focuses particularly on the quality of contract enforcement, property rights, the police, and the courts, and moreover it captures the likelihood of crime and violence. The estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5. Higher value of the indicator means higher confidence of people in law enforcement. Thus the expected sign for analysis is positive as higher confidence in law enforcement should attract more FDI inflows to the particular country.

### **4.3.5 Financial Market Depth**

Financial market development is represented by Financial Market Depth indicator. I constructed this indicator following previous studies, e.g. Levine & Zervos (1996) or Gregorio & Guidotti (1995) , which typically use some measure of broad money to GDP ratio as a Financial Depth Market indicator. Concretely I decide to use M2 monetary aggregate divided by GDP as approximation of financial market development. The data come from World Bank database (World Bank, 2012), more concretely from World Development Indicators (WDI) database and Global Development Finance (GDF) database. M2 monetary aggregate is called money and quasi

money in the database and is given in current local currency unit(LCU). It is defined as the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. This definition is in line with definition of M2 used by various institutions, for example in database of International Monetary Fund (IMF). GDP at purchaser's prices is defined as the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Deductions for depreciation of fabricated assets or for depletion and degradation of natural resources are not included. The GDP is also provided in LCU so the resulted indicator is without any unit. As more developed financial market should encourage more investment I expect this variable to have positive sign.

# Chapter 5

## Methodology

There are numerous challenges in analysing FDI determinants as for example possible endogeneity of explanatory variables, unbalanced dynamic panel data or problem of bias due to outliers. The most serious problem seems to be possible endogeneity of some explanatory variables. Endogeneity is defined as correlation of explanatory variables or dependent variable with past and possibly current realizations of errors. Economically endogeneity of explanatory variables would mean that FDI flows influence economy in host country. If such influence exists, the macroeconomic explanatory variables, such as GDP per capita, real exchange rate or inflation, are expected to be correlated with the error terms. The endogeneity problem violates one of the most important Ordinary Least Squares (OLS) assumptions that the errors are uncorrelated with the dependent variable. This fact prevents me from using OLS estimator to explore relationship between FDI flows and its determinants, as OLS method could produce biased and inconsistent parameter estimates. How to solve this problem? The best solution is probably to find some instrumental variables instead of endogenous ones. These instrumental variables should satisfy two conditions: they should not be correlated with error terms and on the contrary they should be correlated with the endogenous variables. Then for example Two stage least square (TSLS) model can be applied to the dataset and if the instrumental variables are good enough then the resulting TSLS estimator can be shown to have similar statistical properties as OLS model. However in reality it is quite difficult to find good enough instrumental variables. One of possible solutions is to use the Arellano-Bond or Arellano-Bover /Blundell-Bond estimators (see: Arellano & Bond (1991), Arellano & Bover (1995), Blundell & Bond (1998)), to analyse the relationship between FDI flows and macroeconomic variables. The main advantage of those estimators over OLS method is that they can extract the correlation between dependent variable or independent variables and errors. It means that the final es-

timator is not biased any-more. The main advantage of mentioned estimators over other methods, which are designed to deal with endogeneity, is that they use lagged values of variables as instruments. So it is not necessary to have in hand set of good new instruments.

## 5.1 Difference and System GMM estimators - introduction

Arellano-Bond estimator is known Difference GMM estimator because the first step is to transform all variables by differencing them and it use the Generalized Method of Moments for estimation. Arellano-Bover /Blundell-Bond estimator is called System GMM model because it is based on a system of two equations - equation transformed by differencing and the original one. This change allows to introduce more instruments, which can dramatically improve efficiency of Difference estimator in case of persistent dependent variable. However it works only if the first difference of instrument variables are uncorrelated with the fixed effects. Both, the Difference and System GMM dynamic panel estimators have been quite popular in recent years, in fact they are part of broader historical trend in econometric practice. Trend, which lead toward estimators with fewer assumption about the underlying data generating process and use more complex techniques to isolate useful information (Roodman, 2006). The GMM dynamic panel estimators are designed for datasets with few time periods and many individuals. The dependent variable can be dynamic and independent variables need not to be strictly exogenous. The estimators can also handle fixed individual effects or heteroskedasticity and autocorrelation within groups (but not across them). As it seems that the Difference and System GMM estimators are plausible for analysis of determinants of FDI flows I discuss their application on my dataset in next paragraphs. I highlight the advantages of using the estimators on my dataset but I also describe how I solved problems.

I am interesting in estimating the parameters of model of following form:

$$y_{i,t} = \lambda y_{i,t-1} + X_{i,t}\beta + \epsilon_{i,t}$$

$$\epsilon_{i,t} = \mu_i + \nu_{i,t}$$

where  $y$  denotes FDI flows as share of GDP, variable  $X$  is the vector of macroeconomic and qualitative explanatory variables and  $\epsilon_{i,t}$  is error terms. As you can see the error terms  $\epsilon_{i,t}$  consists of orthogonal components: the unobserved time-invariant

(fixed) country specific effect  $\mu$  and the idiosyncratic shocks  $\nu$ . The country specific effects as for example political regime, natural resources abundance or distance to home countries display little if any variance over the period of analysis for my dataset so it seems plausible that they are considered as fixed individual specific effects. By construction lagged FDI flows  $y_{i,t}$  are correlated with the unobserved country specific effects - one component of error term, which means that lagged FDI flows are endogenous now. There are two possible strategies how to treat this problem in framework of GMM estimators. One strategy, incorporated in the Difference GMM estimator, is to transform the data to remove the unobserved country specific effects. The other, used in System GMM estimator, is to instrument lagged FDI flows with variables uncorrelated with fixed effects.

## 5.2 Difference GMM estimator

I start with the Difference GMM model and so at first I discuss the strategy relying on taking the first difference of the original equation. First differencing the model equations eliminates the unobserved fixed country-specific effects and it generates following equation:

$$\Delta y_{i,t} = \lambda \Delta y_{i,t-1} + \Delta X_{i,t} \beta + \Delta \nu_{i,t}$$

Even though transformation above removes the endogeneity concerns connected with fixed effects, the transformed lagged dependent variable  $\Delta y_{i,t-1}$  is still potentially correlated with the other component of the error term  $\Delta \nu_{i,t}$  and thus it is potentially predetermined or endogenous. However first-difference transformation is not applied randomly. The main advantage of this transformation beside removing fixed effects is that it ensures that lagged values of FDI flows dated  $t-2$  and earlier are orthogonal to the error term, which implies that I can use them as instrumental variables and thus I can treat transformed lagged dependent variable  $\Delta y_{i,t-1}$  as another not strictly exogenous explanatory variables in my model. There is one disadvantage of first-difference transformation I want to mention. The disadvantage is that the transformation increases the gaps in unbalanced panel so if one examines just few time periods with some missing values  $y_{i,t}$  the dataset can be substantially reduced or it can even completely disappear in first difference. It should not be serious problem in my case because my dataset consists of fifteen time periods, which is quite a lot in framework of discussed models.

The first-difference transformation eliminated the panel bias so the possible endogeneity of some variables is the biggest problem now. As I mentioned above the best solution of this problem is to use instrumental variables instead those corre-

lated with the error. But usually researchers do not have external variables suitable for being good instruments in hand. Thus it seems as good idea try to find instrumental variables inside the data set. Under the assumption of serially uncorrelated error term  $\nu_{i,t}$  (i.e.  $E[\nu_{i,t}\nu_{i,s}] = 0$  for  $i = 1, \dots, N$  and  $s \neq t$ ) it is possible to use past observations of predetermined or endogenous variables as set of internal instruments. Moreover you can choose between using  $y_{i,t-2}$  or  $\Delta y_{i,t-2}$  as an instruments for not strictly exogenous variables because both of them should be correlated with transformed lagged FDI flows  $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$  and uncorrelated with the transformed error term  $\Delta \nu_{i,t} = \nu_{i,t} - \nu_{i,t-1}$ . Usually the  $y_{i,t-2}$  is preferred for short panel datasets because  $\Delta y_{i,t-2}$  is available as instrument only if  $T \geq 4$ , while  $y_{i,t-2}$  is available already from  $T \geq 3$ . Estimation with second lag of FDI flows  $y_{i,t-2}$  as instrumental variables lead to consistent, but not efficient estimate. The efficiency of the estimation can be improved by introducing more information to the model, which can be done for example by adding further lags as additional instruments. The Difference GMM model use Holtz-Eakin et al. (1988) methodology for this purpose. Mentioned methodology replace missing values of unbalanced panel with zeroes and then create one instrument for each time period, which yields instrument matrix  $Z$  of following form:

$$\mathbf{X} = \begin{pmatrix} 0 & 0 & \dots & 0 \\ y_{i,1} & 0 & \dots & 0 \\ 0 & y_{i,2} & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ \vdots & \vdots & \ddots & y_{i,T-2} \end{pmatrix}$$

I included also the first row of zeroes to illustrate that the instrumenting start in period  $t = 2$  and that the  $y_{i,t-2}$  is missing just for the first observation. Now having the instrument matrix one can create  $m = (T - 2)(T - 1)/2$  moment conditions:

$$E[y_{i,t-s}\Delta\nu_{i,t}] = 0 \text{ for } t \geq 3 \text{ and } s \geq 2$$

or shortly written:

$$E[Z_i\nu_i] = 0$$

To improve efficiency of the model it is recommended to use all "valid" lags of the untransformed variable to instrument those variables that are not strictly exogenous. The valid means lags two and further for endogenous variables, and

lag one and further for predetermined ones. Despite the fact that inclusion of full set of instruments enhance efficiency it is potentially dangerous for panels with many periods because the number of instruments is quadratic in  $T$  (the method described above generates one column for each time period and lag available to that period), which implies various problems for datasets with many periods. I discuss this topic below. The Difference GMM estimator described above in details should be in theory consistent and efficient for dynamic panel dataset with fixed individual effect, which is characteristic by many individuals and few time periods, where some of explanatory variables are not strictly exogenous and with data inside each group which can show sign of heteroskedasticity or autocorrelation. this holds under the following assumptions: the errors are not serially correlated and moreover they are i.i.d. and instruments are strongly correlated with instrumented variables. Although the violation of mentioned assumption causes the model to be inefficient or even inconsistent, there are some ways how to go around these problems. If the errors are serially uncorrelated but they are non-identically distributed, robust error correction or two step estimator may help. But covariance matrix of the transformed errors is needed for these methods and because it is not known it needs to be estimated, which can be difficult.

### 5.3 The System GMM estimator

The efficiency of the estimate can be increased also by applying the System GMM estimator instead of the Difference one. This approach was firstly described at Arellano & Bover (1995). The approach is based on difference transformation of the instruments instead of transformation of original variables. However the transformation of the instruments does not expunge fixed effect. Which means that additional assumption, that changes in instrumenting variables are not correlated with fixed effect, needs to be adopted to assure the instruments become exogenous to fixed effect after the transformation. The problem with the additional assumption is that it is not trivial and it can hold only if the fixed effect and autoregressive process compensate each other in expectation across the whole dataset. To answer the question when it happens the autoregressive process needs to be explore more closely. The autoregressive process is driven by  $\alpha$ , which is the coefficient of lagged dependent variable in the basic model setting. Blundell & Bond (1998) demonstrated that if the absolute value of the coefficient  $\alpha$  is lower then one, the autoregressive process converges in expectation and the deviation of initial observation from long-term convergent values is not correlated with the fixed effect. For simplicity they use

just simple autoregressive model without control variables  $y_{i,t} = \alpha y_{i,t-1} + \mu_i + \nu_{i,t}$  in formalization of the idea. The point in which the positive fixed effect and autoregressive process, with coefficient lower than one, compensate each other and to which the model is expected to converge is:  $y_{i,t} = \mu_i / (1 - \alpha)$ . This point is long-run mean of examined model. Now it is clear under which condition the System GMM model can be applied so it is time to explain the model specification in more details. Although the characteristic feature of the System GMM model is that it works with untransformed equation and transformed instruments, it usually incorporates also the transformed equation from Difference model. It means that usually the dataset with twice the observation is created for GMM model, where the untransformed observations follow the transformed data for each country. This enhanced dataset is created by left-multiplying the original by an enhanced transformation matrix.

$$\mathbf{M}_*^- = \begin{pmatrix} M_* \\ I \end{pmatrix}$$

where  $M_* = M_\perp$ . So for each country I get

$$\mathbf{X}_i^- = \begin{pmatrix} X_{i*} \\ X_i \end{pmatrix}, \mathbf{Y}_i^- = \begin{pmatrix} Y_{i*} \\ Y_i \end{pmatrix}$$

It is not so straightforward to create the instrument matrix  $Z_-$  for the System GMM model. Although it is possible to enter a full GMM-style set of difference instruments for the levels equation and use all available lags similarly as the levels instruments entered for the transform equation, it is not the best way because most of such constructed instruments would be mathematically redundant. The redundancy is caused by the fact that some moment condition of System GMM model are equal to the moment conditions of original Difference GMM model, which yield the same instruments, and finally these same instruments become to be redundant. So the GMM-style instruments can be used but to avoid redundancy the instruments for the transformed data need to be set to zero for levels observations, and analogically the instruments for level data need to be set to be zero for the transformed observations. Thus the augmented instrument matrix  $Z^-$  take the form:

$$\mathbf{Z}^- = \begin{pmatrix} Z_* & 0 \\ 0 & Z \end{pmatrix}$$

The moment condition is then:

$$E[\Delta y_{i,t} \varepsilon_{i,t}] = 0 \text{ for } t \geq 2$$

for predetermined variables and

$$E[\Delta y_{i,t-1} \varepsilon_{i,t}] = 0 \text{ for } t \geq 3$$

for endogenous variables. Finally the moment conditions can be used to create the System GMM instrument matrix. For predetermined variables it is:

$$\mathbf{X} = \begin{pmatrix} 0 & 0 & 0 & \dots \\ \Delta y_{i,2} & 0 & 0 & \dots \\ 0 & \Delta y_{i,3} & 0 & \dots \\ \vdots & \vdots & \vdots & \ddots \end{pmatrix}$$

The instrument matrix for endogenous variables would contain one more row of zeros, representing exclusions of periods  $t = 1$  and  $t = 2$ . Thus the model can be estimated. The another advantage of System GMM model is that because the fixed effect does not disappear, it allows for adding of time-invariant regressors to the model, which would be removed from Difference GMM model after transformation. The presence of additional, the time-invariant, variables in the model should not influence coefficients of other variables. However as I already use lot of determinants in my model I am not exploring this opportunity.

## 5.4 Problem of too many instruments

Instrument proliferation problem is one of the most serious threat, which one faces using Difference and System GMM estimator, because it makes the asymptotic results about the estimators and thus also the specification tests misleading. Basically too many instruments causes two types of problems in Difference and System GMM framework: classical small sample problem that applies to instrumental variable estimators in general and modern small sample problem linked with use of feasible efficient GMM. Both types of problem arise if number of instruments is large relative to number of endogenous variables. It can happen in two cases: if the size of examined sample is small, i.e. there is no many individuals, or if T - number of time periods is large. Large T generate huge instrumental matrix because, as I explained above, the instrument count is quadratic in T.

The size of my dataset is relatively small - there is just 31 countries included in the analysis and I also I work with 15 time periods which is many relative to number of individual countries. Thus I needed to apply some techniques for reducing instrument count on my dataset to avoid instrument proliferation problem. At first I decided to use less common instrument reduction technique which combines instruments through addition into smaller sets. The bright side of this approach is that it maintains more information because it combines the lags rather than dropping them. The approach is analogous to imposing the constraint in projecting variables onto instruments created by Holtz-Eakin et al. (1988) methodology such that certain subsets have the same coefficient. Thus the instrument matrix of Difference GMM estimator collapse to:

$$\mathbf{X} = \begin{pmatrix} 0 & 0 & 0 & \dots \\ y_{i,1} & 0 & 0 & \dots \\ y_{i,2} & y_{i,1} & 0 & \dots \\ y_{i,3} & y_{i,2} & y_{i,1} & \dots \\ \vdots & \vdots & \vdots & \ddots \end{pmatrix}$$

and the instrument matrix of System GMM to:

$$\mathbf{X} = \begin{pmatrix} 0 \\ \Delta y_{i,2} \\ \Delta y_{i,3} \\ \Delta y_{i,4} \\ \vdots \end{pmatrix}$$

Formally the Difference GMM moment condition take the following form: The moment condition is then:

$$E[y_{i,t-l}\Delta\varepsilon_{i,t}] = 0 \text{ for each } l \geq 2.$$

The described technique makes the instrument count linear in T. But because my dataset is not even small size but I also include many years using this one approach for limiting instrument count is not sufficient and so I adopt also other, more common approach, based on limiting number of periods used. It means that I used just certain lags instead of all available lags. In fact this technique is equivalent to projecting the variables onto the full instrument set created by Holtz-Eakin et al. (1988) methodology, while constraining the coefficients on certain lags in this projection to be 0. Combination of the two above described approaches makes instrument count independent on T (Arellano & Bover, 1995).

# Chapter 6

## Results

The objective of this section is to explain which factors drive FDI inflows to each of seven selected industries for 31 developed countries for the period of 1994-2009. The novelty of this study is decomposition of FDI inflows to developed countries to industry flows. I examine separately determinants for each industry under the hypothesis that type of industry matter. The various determinants for each industry would explain why empirical results are quite poor. The analysis of aggregated FDI flows would be probably lead to biased results as there is quite high level of statistical noise provided by industries with different flows. The following sections evaluate results separately for each industry and the last section of this chapter compares the results between them and also I compare my results with those generated by previous empirical studies.

### 6.1 Agriculture and fishing

The only significant determinant for FDI inflows to agriculture seems to be openness. There are several reasons for such result. I will present them one by one and I start with explanation why there is not any other macroeconomic variable significant beside openness. Then I want to discuss why qualitative variables are all insignificant and at the end of this section I explain the reason for openness to be significant factor for FDI inflows to agriculture. See table 6.1 for the results. Firstly, the set of macroeconomic variables is selected from commonly used FDI determinants which proved itself to be significant in previous studies. This similarity with previous analysis should make my results somewhat comparable to them. It is intuitive that FDI inflows to agriculture should be driven by different factors than inflows to other industries. FDI inflows determinants for agriculture could be probably similar to flows to mining and quarrying but definitely they should be different that

Table 6.1: FDI inflows to Agriculture and Fishing. Source: Author's computations

observation	311
groups	28
instruments	3
F-test p value	0.086
lags	(2 4)
AR(test)	0.33
Sargan	0.87
Hansen	0.39
L.Openes	0.0056*
	(0.00031)

determinants for such industries like financial services. FDI inflows to agriculture should depend strongly on fixed, country specific, effects such as fertility of the soil, weather or availability of water. These variables, which do not change during the observed period, are removed from the analysis by differencing the model equation. The removing of substantial part of determinants from model should be reflected by specification test. As you can see in the table the model with the significant variable is quite poorly specified so that I can reject the hypothesis that all coefficients in the model are zero only on 10% significance level, not on 5% or 1% significance levels.

Now I would like to explain what can be the reason for non significance of all qualitative variables. I am exploring determinants of FDI inflows to the developed countries, which are supposed to possess certain level of development. This level of development is usually accompanied by higher level of qualitative indicators. It is probable that even FDI inflows to agriculture should be influenced by qualitative variable to certain level. Such factors as rule of law or corruption probability should matter at least for low levels of these indicators. For example very poor law enforcement and threat of expropriation certainly increase costs of investments and so it influence mainly decision of investor whether to invest or not at all. As soon as these structural indicators approach some reasonable level, they do not matter any more for agriculture. In addition to rule of law and corruption, there is regulation indicator included in my analysis. This indicator should not matter much for agriculture as it is not and even it was not regulated much during the observed period from the 1994 to 2009. In fact agriculture is one of industries with the lowest level of regulation at all. The average inflation across all countries and all periods reach just 0.07 from possible 6 points. Liberalization of labour market has not been expected to be important for agriculture because it is highly mechanized industry so the labour cost does not constitute substantial part of total costs. Finally agricul-

Table 6.2: FDI inflows to Mining and Quarry. Source: Author's computations

observation	334	334	334	310
groups	29	29	29	28
instruments	3	3	4	5
F-test p value	0.01	0.08	0.01	0.01
lags	(2 4)	(2 3)	(2 3)	(2 3)
AR(test)	0.32	0.32	0.31	0.25
Sargan	0.44	0.99	0.92	0.53
Hansen	0.62	0.96	0.73	0.4
log GDP per capita	0.73***		0.19**	0.21***
	(0.28)		(0.06)	(0.07)
L.Openes		0.0067*	-0.03**	-0.02**
		(0.0036)	(0.01)	(0.01)
labour				-0.79*
				(0.45)

ture usually does not need extra large investment and financial markets in developed countries are generally quite advanced, these are the reasons why financial market depth does not matter much for FDI inflows to agriculture in developed countries.

Why openness should matter for agriculture? The openness is defined as ratio of good and services traded internationally to GDP. So the higher the index the higher is the probability to sale products not only inside target country but also to export them. And this is very important for agriculture, because investor cannot start business in an arbitrary country but she care about some characteristics of soil, weather and water access. As these features differ for each country and each agricultural product it is highly probable that investor earns more when she has an opportunity to export substantial part of production to another countries.

## 6.2 Mining and Quarrying

There are three significant variables for mining an quarrying industry. Two of them are macroeconomic variables and one qualitative. More specifically the significant macroeconomic variables are GDP per capita and openness and the significant qualitative variable is labour market liberalization index. The problem with these variables is that beside log GDP per capita they are not robust. Openness even change its sign. It has positive sign (the expected one) alone and negative sign in specification with other explanatory variables as you can see on table 6.2. The firs macroeconomic

variable, which is also significant for many other industries is log value of GDP per capita. It has positive sign as the theory suggest. So higher log GDP per capita attract more FDI. The explanation is that more developed countries (with higher log GDP per capita) have higher demand for mineral resources and so if there are some mineral resources on their territory it is certainly worth to exploit them. Thus the reasoning is that the bigger the market in economic sense the higher the demand for particular natural resources. As the demand rises prices of natural resources it start to be worthy even for foreigner investor to invest to mining and quarrying in such country.

Mining and quarrying is in many ways similar to the agriculture. It means that it is very export oriented industry as one cannot count on the fact that the resources, that companies need for production, are available in their own country. So still the less restricted trade should mean better possibility to export the resources to the countries with the highest demand. This would explain the positive significant openness in case when I do not check for other explanatory variables. This logic would be probably perfectly suitable for developing countries. But I should probably apply different reasoning for developed countries. After checking for log GDP per capita the openness stay significant but it changes sign from positive to negative. The negative sign would mean that the less 'open' the country is the more investment to mining an quarrying it obtains. Possible explanation is that developed countries with less intensive trade activities are more dependent on their own natural resources than developed countries more with intensive trade activities. The dependence on domestic resources can increase prices of natural resources inside the country and thus investments to the mining and quarrying in this country turns to be more profitable. The higher profitability then tracts more FDI inflows to the less open country.

The last variable which is significant for mining and quarrying FDI inflows is indicator of labour market liberalization. This is expected as mining and quarrying is quite labour intensive and labour cost can be substantial, especially in developed countries. But still the significance is rather weak (10% confidence level).The negative sign is in line with my expectation that more liberalized labour market (lower value of index) should attract more inflows to the economy.

### **6.3 Manufacturing**

Manufacturing results are quite complex. Unlike for agriculture and mining there is a lot of significant variables. As for the other industries I start to examine macroeco-

conomic variables one by one to realise, which of them are significant. Results revealed that there is only one macroeconomic variable that is significant under this specification, which is logarithm of GDP per capita. Log of GDP per capita is widely used determinant, which seems to be positively significant and robust for almost all studies and also for majority of examined industries in my work. It represents market size of targeted country market and in some sense also its development level. In theory positively significant GDP per capita is explained by market seeking reason for inward FDI. Also in my case log of GDP per capita has positive sign, which means that the bigger the market is the higher the investments are. Although the logic behind this is quite intuitive. Although someone could argue that in recent years companies from developed countries rather invest to less developed countries to exploit lower costs it is not generally true. It is certainly true for some types of products however there is still many opportunities for multinational companies to profitably invest to big developed market. For example concerning product safety and quality the producer sometime can assure both only in a developed country and customers from that or neighbour countries are willing to pay more for this quality and safety. So it turns out to be profitable even with higher costs.

The second macroeconomic variable that is significant, but only after checking for log GDP per capita, is the lagged value of dependent variable i.e. the FDI inflows to Manufacturing divided by GDP. This variable is negative and highly significant in model with GDP per capita. It could be interpreted as variable that maintaining certain level of investments to GDP ratio in an economy. It means that there is certain "optimal" level of investments to GDP ratio for investment to manufacturing sector in each country, with regard to its market size or level of development. And whenever the ratio decrease in one year then it attracts more investments in next year and vice versa. In other words, the economy has a certain investment absorption represented by the investment to GDP ratio and whenever the absorption is exceeded it stops to be profitable to invest more to the economy. But then when investment level decreases then new possibilities emerge.

Considering qualitative variables all included are significant for FDI inflow to manufacturing see table 6.3. Although all of the qualitative variables are significant as I mentioned above there is one which is significant also under various model specification. It is indicator of labour market liberalization, which has negative sign in my analysis. The negative sign of the variable is not surprising because the indicator approach lower values for more liberalized labour markets. It means that the less restricted the labour market is (lower value of index) the more FDI flows is attracted to manufacturing. This conclusion is very intuitive as manufacturing industry is still

Table 6.3: Net FDI inflow to Manufacturing. Source: Author's computations

observation	244	349
groups	29	30
instruments	9	5
F-test p value	0	0.007
lags	(2 3)	0
AR(test)	0.16	0.13
Sargan	0.14	0.34
Hansen	0.42	0.4
L.FDI/GDP	-0,14 (0.17)	-0,91*** (0.34)
log GDP per capita	8.23*** (2.31)	6.57*** (1.79)
taxation	-0,54** (2.24)	
labour	-2,60** (1.16)	-3.39* (1.71)
corruption	9.81** (0.033)	
rule of law	-11,79** (4.68)	
financial m. depth	-5,56** (2.24)	

quite heavily dependent on labour work. Under this circumstances more liberalized labour market imply lower costs per worker and thus substantial savings.

Taxation is also significant variable for FDI inflows to manufacturing. The sign for taxation appears to be negative in my analysis, which is in line with intuition. The decrease in tax level attracts more FDI inflows to the host country, because the overall costs decrease and so the investment turns to be more profitable. Manufacturing is only industry for which taxation appears to be significant variable.

The other qualitative variables, which are significant for FDI inflow to manufacturing are rule of law and control of corruption. For both variables higher value means better institutional quality so I expected both of them to be positive. But it is not the case. While the control of corruption index has positive sign, which means that less corrupted countries attract more FDI inflows. The rule of law indicator attains negative value which would mean that countries with lower trust in law enforcement would attracted higher FDI inflows. This result is intriguing as well as the following one. The last significant variable for manufacturing is financial market depth, with negative sign. This result would mean that less developed financial market should attract more FDI inflows, which is in contrast with theoretical concepts.

Table 6.4: FDI inflows to Electricity, Gas and Water. Source: Author's computations

observation	309	270	309	270	246
groups	28	24	28	24	28
instruments	2	3	3	6	3
F-test p value	0	0	0	0.015	0
lags	(2 3)	(2 4)	(2 4)	(2 3)	(2 3)
AR(test)	0.64	0.68	0.65	0.65	0.78
Sargan	0.28	0.88	0.45	0.84	0.42
Hansen	0.38	0.66	0.58	0.71	0.57
log GDP per capita	0.53*** (0.11)			-3.63** (4.38)	0.52*** (0.15)
L.REER		0.61*** (0.18)		2.84 (3.15)	
L.Openes			0.02*** (0.004)	0.005 (0.015)	
regulation					-0.16* (0.09)

## 6.4 Electricity, Gas and Water

There are four significant determinants for FDI inflows to Electricity, Gas and Water industry. Three of them are macroeconomic variables: log GDP per capita, real effective exchange rate (REER) and openness, the fourth is from the group of qualitative variables, concretely regulation index. The mentioned macroeconomic variables are significant only if I consider them one by one. If I put them to the single equation, two of them turn out to be insignificant and log of GDP per capita switch its sign from positive to negative, which is suspicious and contra intuitive. So I rather decided to examine them one by one controlling for qualitative variables. But at first I want to briefly comment each of the macroeconomic variables, see the regression results in table 6.4. All macroeconomic variables, examined one by one have positive sign. The positive sign is expected for log GDP per capita as the more developed and richer countries consume more electricity per person than less developed or not so rich countries. This fact should motivate dependence of FDI inflows to energy industry on log value of GDP per capita. The observed coefficient, which is positive and significant thus is in line with outlined intuition. Also for lagged value of openness the positive sign is not surprising because a country more open to trade should received more FDI inflows as there is higher chance to sell the products not only domestically, but also to other countries so in fact high openness enlarges the market. The positive sign for lagged value of REER suggests that the investments

Table 6.5: FDI inflows to Financial Services. Source: Author's computations

observation	373	297
groups	31	27
instruments	4	3
F-test p value	0	0
lags	(2 3)	(2 3)
AR(test)	0.33	0.42
Sargan	0.22	0.41
Hansen	0.55	0.41
L.FDI/GDP	2.03***	0.34
	(0.08)	(0.34)
log GDP per capita	-16,25	
	(14.68)	
regulation		14.4**
		(6.78)

to transportation are at least partly motivated by acquisition of transferable assets rather than by low costs of capital. As electricity is an industry where industry specific assets matter substantially it is also expected result.

The only qualitative variable, which is significant is regulation index. This fact is not surprising as Electricity, Gas and Water industry have always belonged among strategical industries and as such it was highly regulated by state. Mainly there were even prohibitive barriers to entry and state companies dominated on the market.

## 6.5 Financial Services

Lagged values of the dependent variables seems to be the only significant explanatory variable unless I check for regulation, then regulation overweight the past values and start to be significant. For the results see table 6.5 It is obvious that financial services sector is highly influenced by regulation in each country, but the regulatory pattern is different than in other industries. Financial services have been always provided by private owned companies but they have always been highly regulated due to information asymmetry. Although the regulation, which also restrain competition, is relatively high even nowadays, it does not prevent foreign companies from entry any more. On the contrary the positive sign of regulation regressor means that higher anticompetitive regulation attract more FDI. The possible explanation for this unexpected direction of influence lays in motivation for the FDI inflows to financial intermediation industry. As I mentioned above FDI inflows to financial

Table 6.6: FDI inflows to Telecommunication Source: Author's computations

observation	266	230	266	266	230
groups	28	24	28	28	24
instruments	2	2	2	2	8
F-test p value	0.01	0.09	0.03	0.07	0.07
lags	(2 3)	(2 3)	(2 3)	(2 3)	(2 3)
AR(test)	0.35	0.35	0.36	0.34	0.35
Sargan	0.29	0.27	0.21	0.3	0.21
Hansen	0.44	0.23	0.46	0.38	0.43
log GDP per capita	0.8***				3.27
	(0.28)				(6.5)
L.REER		0.06*			-1.63
		(0.03)			(4.96)
L.Openes			0.02**		0.02
			(0.08)		(0.04)
L.CPI				0.15*	-0.69
				(0.08)	(1.19)

services are among others motivated by the the effort of gaining more market power, which could be easier if the anticompetitive regulation is higher in the market.

## 6.6 Telecommunication

I find four significant variables, under the one by one analysis, for telecommunication industry. All of them are macroeconomic variables, which is a little bit surprising because I expected that FDI to tertiary sector is driven rather by qualitative than by macroeconomic variables. For results see table 6.6. The logarithm of GDP per capita fulfil my expectation and appears in regression with positive sign. It is quite intuitive that bigger markets in economic sense of view (more developed and richer) attract more FDI to telecommunication because this services usually cannot be exported and so its need big market in host country. The second significant variable is lagged value of real exchange rate, which also have positive sign. As I explained in case of electricity, gas and water industry, the positive sign of real exchange rate means that motivation for FDI inflow to telecommunication is an effort to acquire transferable assets for good price rather than to explore the low costs of capital. As in the case of electricity gas and water, specific transferable assets are important for telecommunication and so the result is not surprising. Another significant variable is openness also with predictable positive sign, but here the motivation of more confidence toward more 'open' market could be more important because as I

mentioned above the telecommunication services cannot be exported easily. The last slightly significant macroeconomic variable is lagged inflation. This variable represents very frequently the stability of the economy, and so lower inflation is usually perceived as more encouraging for FDI inflows (at least for developing countries with unstable economies), which would mean negative sign in regression. However all countries I examine are developed countries with stable economies and so higher inflation in this case probably means faster economic growth, which would explained the positive sign.

## 6.7 Transportation

Transportation has been relatively highly deregulated in past 20 years. Although countries with relatively high level of regulation in transportation can be still found, there is not many of them. On the contrary many countries liberalized markets concerning transportation substantially in observed period. So high level of regulation and following liberalization of markets should be captured by analysis. But lets start with macroeconomic variables as in previous cases. The macroeconomic variables, which determines inflows of FDI to transportation are log value of GDP per capita, real effective exchange rate and openness of the country to international trade. Although there are three significant macroeconomic variables they are significant only if I analyse them one by one. If I put them all together they are not significant any more. The only qualitative variable that matters is index which measure regulation of markets connected with transportation. These results are in line with my expectations as I considered product market as one of the most important determinant for transportation in observed period. I discuss briefly each determinant in next few paragraphs. Meanwhile you can check table 6.7 for the results. Firstly log of GDP per capita is significant as in many previous cases. The intuition is as follow: transportation is fairly expensive and in many cases also dispensable service, so it really matters if people can afford it. The best way how to determine, if people can afford dispensable services, is to look on the GDP per capita because it captures well purchasing power of inhabitants. Thus the result is in line with expectation (log GDP per capita is significant and positive), which means that the FDI inflow to transportation are attracted to developed countries with higher purchasing power and larger market in economic sense.

The second variable which significantly influence FDI inflows to transportation is real effective exchange rate. It should hold that Real effective exchange rate increase the FDI inflow to the economy, because when exchange rate decline it enables to

Table 6.7: FDI inflows to Transportation. Source: Author's computations

observation	375	332	375	332	279
groups	30	26	30	26	26
instruments	2	2	2	6	7
F-test p value	0	0.15	0	0	0
lags	(2 3)	(2 3)	(2 3)	(2 3)	(2 3)
AR(test)	0.39	0.35	0.4	0.37	0.31
Sargan	0.11	0.64	0.1	0.15	0.3
Hansen	0.23	0.59	0.41	0.6	0.58
log GDP per capita	1.08***			-3.06	-3.10
	(0.26)			(6.06)	(7.39)
L.REER		0.06**		0.13	0.22
		(0.02)		(0.23)	(0.28)
L.Openes			0.03***	0.01	0.03
			(0.01)	(0.03)	(0.14)
regulation					-2.99*
					(1.63)

buy asset for favourable price and vice versa.

The last from significant macroeconomic variable, whit positive sign is openness of the country to international trade. It is quite obvious that it is more profitable for most companies in transportation industry to operate not only domestic, but also international transport lines. It gives them more possibility for development and also it brings them higher profits. So the more open the market is to international trade in goods and services, the higher the FDI inflow should be.

The last and may be the most important determinant of FDI inflows to transportation is variable from institutional group of variables regulation. Why I mentioned that it could be the most important variable? There are two main reasons. If I include it to my model all other variables stay insignificant and only the regulation indicator matters. This feature is probably given by high level of regulation of transportation in the past two decade. It was practically prohibited to invest to transportation industry in many countries. During the past fifteen years the regulation relaxed and there was usually some foreigner investors waiting to buy a share in privatize company as soon as possible.

## 6.8 Industry comparison

The results support the theory that FDI inflows to each industry is driven by different forces. Despite the fact that log GDP per capita represents significant determi-

nant with positive sign for majority of examined industries, the other determinants differs a lot. While there is hardly one significant variable for agriculture FDI flows, there are six significant variables for manufacturing industry. The sign of significant variables also sometimes vary industry by industry as for example in case of product market liberalization. There is expected positive sign for FDI inflows to electricity, gas and water industry and transportation but there is also negative sign for financial services.

Now I take a closer look on similarities and differences in determinants for industries from the same sector. Considering primary sector, agriculture and mining and quarrying have the same significant determinant which is openness. This variable have a positive sign for agriculture and also for mining and quarrying examining macroeconomic variables one by one. So if I take into account that openness is the only significant determinant for agriculture and one of three significant determinants for mining and quarrying the industries do not differ too much but they are neither too similar. Speaking of secondary sector the only variable which is significant for both manufacturing and electricity, gas and water industry is log GDP per capita. Even here log GDP per capita have the same sign for both industries considering analysis of macroeconomic variables one by one. However in this case I evaluate determinant for each of considered industries as substantially different as only one of seven variables for manufacturing and just one of four determinants for electricity, gas and water is similar. Comparing industries in tertiary sector you can see that determinants of FDI inflows to transportation and to telecommunication are more similar than FDI inflows to financial services. I would even say that FDI inflows determinants for telecommunication and transportation are very similar. Three, from four, significant determinants are the same for each industry, which means that only one determinant differ. The log GDP per capita, lagged value of trade openness a lagged value of real exchange rate have the same positive sign in one by one analysis of macroeconomic determinants. On the contrary FDI inflows to financial sector seem to be driven by very distinct set of variables. There are just two significant variables: lagged value of dependent variable and regulation, which have different sign comparing with regulation regressor in FDI inflow analysis for transportation.

All fact presented above support the idea that FDI inflows determinants for each industry differ substantially, which means that anybody who want to examine FDI inflows determinants should do this industry by industry, otherwise analysis will be biased toward the industry, which account for the bigger part of FDI inflows.

# Chapter 7

## Conclusion

I analysed data on FDI inflows by industry to thirty-one developed economies during fifteen years, from 1994 till 2009 in order to decide whether the FDI inflows determinants differ for each industry and also to answer question how qualitative variables, mainly labour market and product market liberalization and changes in taxation influence the inflows to each industry. I selected seven industries for my analysis to be able to answer the underlying questions. Namely the industries are: Agriculture and Fishing, Mining and Quarrying, Manufacturing, Electricity, Gas and Water, Telecommunication industry, Transportation industry and Financial Services. The selection is not random I choose two industries from each sector plus financial services. There is not many choice in terms of industries for primary and secondary sector, but form tertiary I selected those industries which was recently liberalized so that I could observe the effect of this liberalization on FDI inflows.

I applied the system GMM model to explore my dataset. I choose this model because it is suitable for analysis of panel dataset with dynamic dependent variable, fixed effect, endogeneous explanatory variables and another exogeneous variables. Despite all these advantages there are also some threats in using System GMM model. The main problem of application of System GMM model to my dataset was the fact that the dataset is small but for long time period so instrument count can easily exceed number of countries and then the tests are not reliable. I solved this by using techniques for limitation number of periods.

My results support hypothesis that each industry differ in terms of FDI inflows determinants, especially when I take in account industries from various sectors. For example: while there is just one significant determinant for FDI inflows to agriculture in my dataset there are numerous significant determinants for FDI inflow to manufacturing or for example to transportation. Although inflows to four of seven industries are determined by log value of GDP per capita the other significant de-

terminants for each of them differ substantially. While the inflows to transportation are substantially driven by deregulation of product market, beside GDP per capita, the inflows to telecommunications does not depend on any of examined qualitative variables and it is driven by macroeconomic variables only. Therefore it is probable that results from previous studies, which use data aggregated for the whole economy are biased.

Considering selected qualitative variables, the results show that they are significant for five of seven examined industries. Concretely labor market liberalization is significant determinant for mining and quarrying and manufacturing. In both cases the sign is negative as I expected. The negative sign means that more liberalized labor market attract more FDI inflows to the particular industry. Thus these findings support my hypothesis that labor market liberalization attracts more FDI inflows. Speaking of product market liberalization, it is significant determinant for three of the industries I explored. Namely it is significant for electricity, gas and water, for transportation and for financial services. The product market liberalization has expected negative sign for the first two industries and unexpected positive sign for financial services. Thus my findings does not fully support the hypothesis that product market liberalization attract more FDI inflows. It sees that higher competition in product market (more liberalized product market) could caused that companies need to decrease margins and so its revenues drops as well, which cause lower FDI inflows to the particular market, when the product market liberalization increase. Considering taxation the results suggest that it is significant just for manufacturing with expected negative sign. Thus the results support my hypothesis that lower taxes attract more FDI inflows. Additional qualitative variables I included are control of corruption, rule of law and financial market depth. All these additional variables are significant just for manufacturing. Control of corruption behaved in expected way - i.e. lower corruption attract more FDI. The other two variables have unexpected sign. Lower faith in rule enforcement and less developed financial market attract more FDI inflows to manufacturing sector according my results. These conclusions are in my opinion specific for the industry and their meaning is that FDI inflows to manufacturing are attracted by less developed economies because manufacturing companies seek lower costs.

The results presented above in some sense preliminary and still lot of work is needed to verify if they are robust and widely valid or not. There should be done more analysis using different models maybe and definitely they ought to be extended to wider range of countries, for example they should include also developing countries. In addition I selected determinants, which had potential to be significant for all

of examined industries, as I wanted to show, that with the same determinants set there are different determinants significant for various industries. Now with results, showing how the determinants differ, the industries could be explored one by one considering set of determinants more specific for each industry.

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