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# Greenfield Foreign Direct Investment and Structural Reforms in Europe: What Factors Determine Investments?

Erik Canton and Irune Solera

## Abstract

Greenfield FDI flows into EU countries account for a non-negligible share of total EU FDI. They create new capital assets and additional production capacity which are important elements to support the transition to a stronger European growth path. This project investigates determinants of greenfield FDI flows into the EU countries using sectoral data on bilateral greenfield FDI flows and associated job creation for the 2003-2014 period. The dataset covers the 28 EU countries and also includes as country of origin the main non-EU investors. A gravity model explaining FDI from distance indicators and policy variables is built, while controlling for other important factors, employing Heckman two-step selection procedure. The results suggest that the business climate (from World Bank's Doing Business) and product market regulations (from OECD's PMR) are important determinants of greenfield investment in the EU. This project provides additional evidence on the importance of removing unnecessary regulatory barriers to investment and could help in the discussion on the Investment Plan for Europe.

**JEL Classification:** C33, C34, E22.

**Keywords:** Greenfield investment, Heckman model, business climate, product market regulation, regulatory barriers to investment.

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## 1. INTRODUCTION

Investments in tangible and non-tangible assets are an important driver of economic growth. While the European economic recovery is ongoing, total investment remains weak in most EU Member States. This is worrying because investment is both a key component of the economy's production capacity and an important source of aggregate demand. This paper focuses on one particular component of investments, namely inward foreign direct investment (FDI). The role of FDI has not received ample attention in the recent discussion on investment weaknesses, though developments since the crisis have been equally disappointing. Indeed, the level of foreign direct investment into the EU has fallen significantly since its peak in 2007.

The persistent weakness in FDI inflows in the EU raises the following questions: what are the main factors influencing the decision to invest in an EU country, and how can the EU become more attractive for investors? In principle, the EU is an attractive place where to invest due to its sheer market size, business-friendly FDI regulation, a highly educated workforce, an integrated Single Market and high productivity levels, among other factors. But other parts of the world are also becoming more and more attractive for foreign investors, and the EU is indeed losing its share in global FDI. While part of the decline in inward FDI in the EU may be associated with adverse cyclical economic circumstances, reversing the downward trend will also require a further strengthening of the business climate.

The environment in which businesses operate is particularly relevant for investment decisions. Measures to reduce red tape and improve the regulatory framework could encourage investment, and thus lift growth in the long run, but also boost economic activity and help the recovery in the short run. This is one of the motivations behind the Investment Plan for Europe, presented in November 2014, which aims at mobilising at least EUR 315 billion of additional public and private investment over the period 2015-2017 and improve significantly the overall investment environment, in particular by removing regulatory bottlenecks.

Three main types of FDI can be distinguished, namely cross-border mergers and acquisitions, greenfield investments and the extension of existing capacity. According to the definition in the data source this paper focuses on the last two: greenfield investments – the creation of a firm from scratch by one or more non-resident investors – and the extension of capacity – an increase in the capital of already established foreign enterprises. In what follows we will include extension of capacity in the definition of greenfield investments. Greenfield FDI thus implies an expansion of the capital stock, directly generating new economic activity and jobs.<sup>2</sup> It is also a vehicle for international technology spillovers, and can thereby contribute to productivity growth.

This study investigates the determinants of bilateral greenfield FDI flows to EU countries for the period 2003-2014. We aim to provide new evidence on the importance of improving the investment environment, thereby contributing to the discussion of the third pillar of the Investment Plan for Europe.<sup>3</sup> The FDI data used come from FDImarkets, a service from the Financial Times. The dataset includes as country of destination the 28 EU countries and as country of origin EU and main non-EU countries. We build a gravity model explaining FDI with distance indicators and policy variables, while controlling for other important factors such as market size and the education level of the population. The policy variables include data on product market regulation from the OECD and on the business environment from the World Bank.

The study is organised as follows. Section 2 provides a general overview of the main FDI trends before and during the crisis, as well as the sectoral composition and identification of the main investors in greenfield FDI in Europe. In Section 3 we provide a brief summary of related literature, focussing on motivations to engage in foreign direct investment, the role of distance in the investment decision, and the inclusion of

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<sup>2</sup> In contrast, the contribution of FDI through mergers and acquisitions to economic activity may be less straightforward as it does not imply an immediate increase in the capital stock.

<sup>3</sup> The Investment Plan is articulated around three pillars: mobilising finance for investments; establishment of a credible project pipeline; and improving the investment environment.

policy variables in the analysis. Section 4 describes in more detail a series of potential drivers of FDI, which will guide the implementation of our econometric strategy. In Section 5 we introduce the econometric model, present the basic results, and carry out a series of sensitivity checks. Section 6 contains results from some policy experiments, in order to get insight into the potential benefits of selected structural reforms for inward greenfield FDI. The paper is wound up in Section 7.

## 2. STYLISTED FACTS: GREENFIELD FDI IN THE EU BEFORE AND SINCE THE GREAT RECESSION

### A. DESCRIPTION OF THE DATASET

Data on greenfield FDI projects are taken from FDImarkets, a service from the Financial Times. The FDImarkets dataset includes new (greenfield) and expansion FDI projects, therefore Mergers & Acquisitions, Privatisation and alliances are not included (joint ventures are incorporated when they lead to a new physical operation). In practical terms this means that a company has to be establishing or expanding a manufacturing plant, service function, extraction operation or building a new physical construction to be included as a greenfield FDI project. An advantage of this type of investment data is that they are less affected by measurement issues, for example connected with the occurrence of round-tripping activities via various EU countries. FDImarkets contains data on capital expenditures and job creation for about 160,000 investment projects worldwide for the period 2003-2014. Next to sectoral information the dataset also includes the country of origin and destination. The greenfield FDI flows information is derived from media sources and can be interpreted as investment commitments. The database is used by the UNCTAD in its World Investment Report, and is also widely used in the academic literature (see for example Di Minin and Zhang, 2010; Davies and Desbordes, 2012; Martin Falk, 2013 and Copenhagen Economics, 2016).

As the dataset does not provide further information at the level of the individual investment projects we have decided to pursue the analysis at the sectoral level. The sectoral classification used in the FDImarkets database follows the North American Industry Classification System (NAICS) 2007. As we want to use a series of sectoral indicators from Eurostat as potential explanatory variables, we have translated the sectoral data to NACE Rev. 2 format.<sup>4</sup> We then have aggregated the data on capital expenditure (capex) and job creation at the letter level in the NACE structure (e.g. "C" for manufacturing), using year, sector, country of origin, and country of destination as dimensions defining the units of observation. Specifically, the data consists of greenfield FDI capital expenditure flows and associated job creation in 12 sectors, 28 EU countries hosting the project, and 38 FDI sending countries (i.e. the 28 EU Member States and 10 major investors Australia, Brazil, Canada, China, India, Japan, Norway, Russia, South Korea, Switzerland and United States) for the period 2003-2014. It should be noted that because of this detailed granular structure of the dataset, many entries will be unobserved. We will elaborately return to this issue when outlining the econometric strategy.

### B. TRENDS AND COMPOSITION OF GREENFIELD FDI

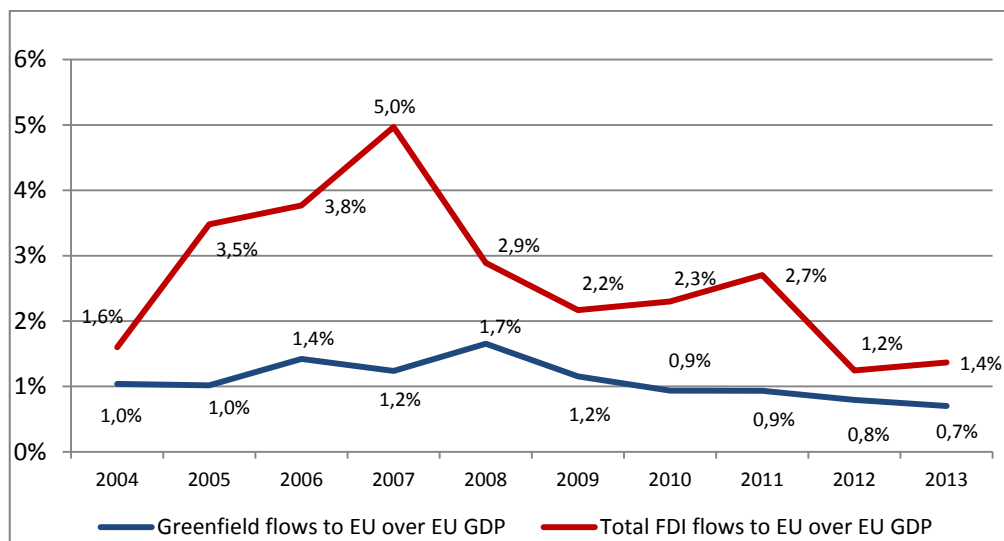
#### **Declining trends in total FDI and greenfield investment in the EU**

Figure 1 shows the developments over time in total FDI (from Eurostat) and greenfield FDI into the EU, expressed as a percentage of EU GDP. Total FDI flows (i.e. greenfield investments and mergers & acquisitions) show a rapid increase in the pre-crisis period between 2004 and 2007, followed by a sharp fall during the global financial crisis and a further reduction during the euro area crisis. In 2013, total FDI in the EU amounted to 1.4% of EU GDP, which was substantially below the pre-crisis peak. Greenfield FDI has been decreasing almost continuously since 2008, but the decline has been more gradual than for total FDI. Also the gap between greenfield FDI and total FDI has diminished abruptly, suggesting more limited M&A activities in recent years. This graph thus tells us that the M&A boom and bust is primarily responsible for the observed spike in total FDI inflows.

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<sup>4</sup> The sectors included in the study are reported in Annex 1.

**Figure 1 Total FDI inflows vs greenfield FDI inflows to EU countries over EU GDP**



Source: Eurostat and Financial Times FDImarkets

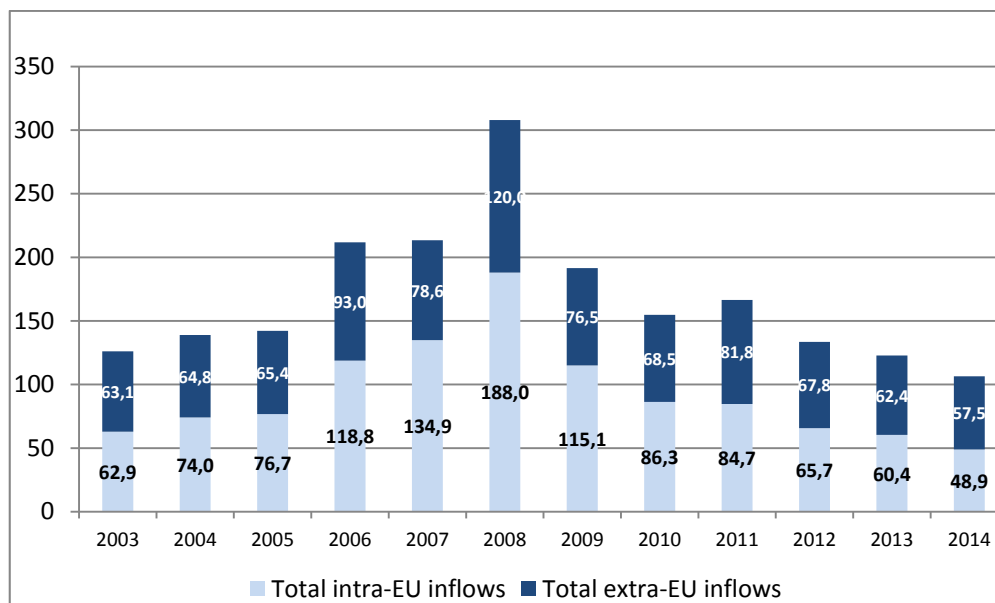
**Since 2012, most greenfield investments are coming from outside the EU**

Figure 2 shows the amount of greenfield investments coming from other EU countries ("total intra-EU inflows") and from third countries ("total extra-EU inflows"). This latter group consists of the top ten investors mentioned earlier (including, inter alia, US, Japan, Switzerland, Russia and Canada). Greenfield FDI is around \$105 billion in 2014, down from \$300 billion at the peak of the FDI cycle in 2008. Greenfield FDI has been decreasing since its 2008 peak, with no clear signs of recovery over the recent years. As a matter of fact, greenfield FDI to EU countries decreased by 13% in 2014 compared to 2013.

When we look at the composition of these greenfield FDI flows in terms of region of origin, Figure 2 shows that since 2012 the largest share of FDI has come from outside the EU. Indeed, during the 2004-2011 period intra-EU flows were larger than flows from non-EU countries but the share coming from non-EU countries has steadily risen since 2007, going from 37% in 2007 to 54% in 2014. This could be explained by two facts. First, the economic recession may have halted European firms' expansion plans. Second, the declining share of intra-EU greenfield FDI may also reflect the natural adjustment after an exceptional increase in intra-EU FDI flows caused by EU enlargement in 2004 and 2007, combined with strong economic growth during that period. In fact, Poland, Romania, Bulgaria and Hungary were among the ten main recipients of EU greenfield FDI flows over the period 2004-2008 (e.g. PL attracted the second largest share of EU greenfield FDI).



**Figure 2 Greenfield FDI inflows to EU countries (\$bn)**

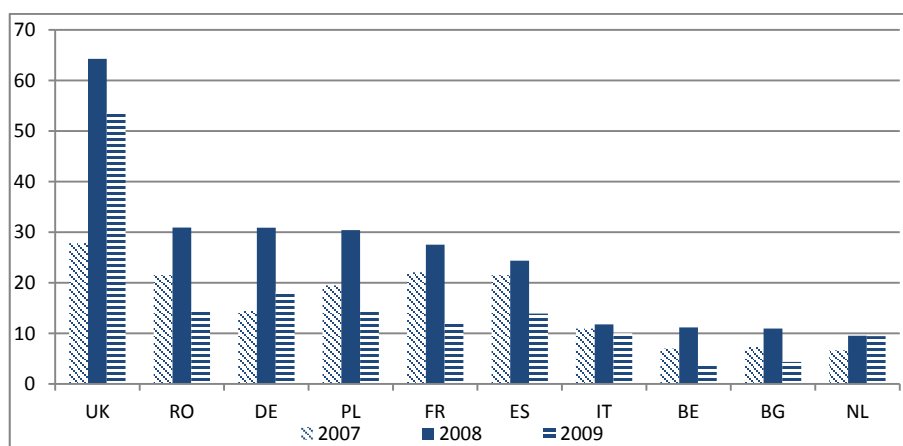


Source: Financial Times FDImarkets

### Greenfield FDI peaked in 2008

As Figure 2 shows, greenfield FDI peaked in 2008. This seems an atypical year with an unexpected greenfield FDI boom. To further inspect the causes of this peak, we plot in Figure 3 the greenfield FDI flows in the ten main EU recipients in 2007, 2008, and 2009. The figure shows that in 2008 the UK attracted the largest volume of inflows, followed by RO, DE and PL. Most of the greenfield FDI projects in the UK were in the electricity and construction sectors (30% and 22%, respectively, of total greenfield FDI flows to the UK). Those investments mainly came from European countries. In the case of electricity they were directed to the wind electric power subsector, with companies such as RWE, Iberdrola and Dong Energy being the main investors.

**Figure 3 Greenfield FDI inflows to the 10 main EU recipients in 2007, 2008 and 2009. Understanding the atypical 2008 year.**

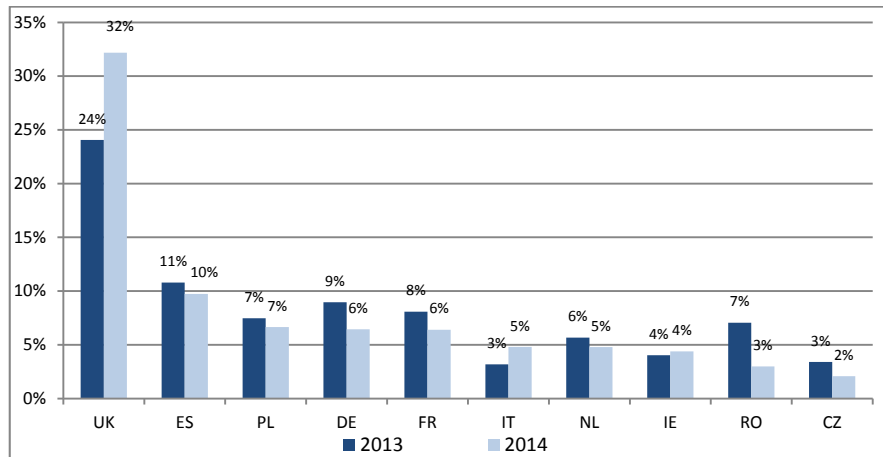


Source: Financial Times FDImarkets

### UK is EU's main recipient of greenfield FDI

Figure 4 shows the share of greenfield FDI of the main recipients in total greenfield FDI in the EU. The United Kingdom has been by far the largest beneficiary of greenfield FDI in Europe, followed by Spain and Poland. Furthermore, the UK managed to expand its share in 2014 to almost one third of total greenfield FDI in the EU. Germany only appears fourth. Interesting is the case of Italy that attracts less FDI than its size would suggest (though in 2014 greenfield FDI inflows grew by 31% compared to 2013).

**Figure 4 Largest European Greenfield FDI recipients in 2014 and 2013. Share of Greenfield FDI inflows over total Greenfield FDI into EU.**



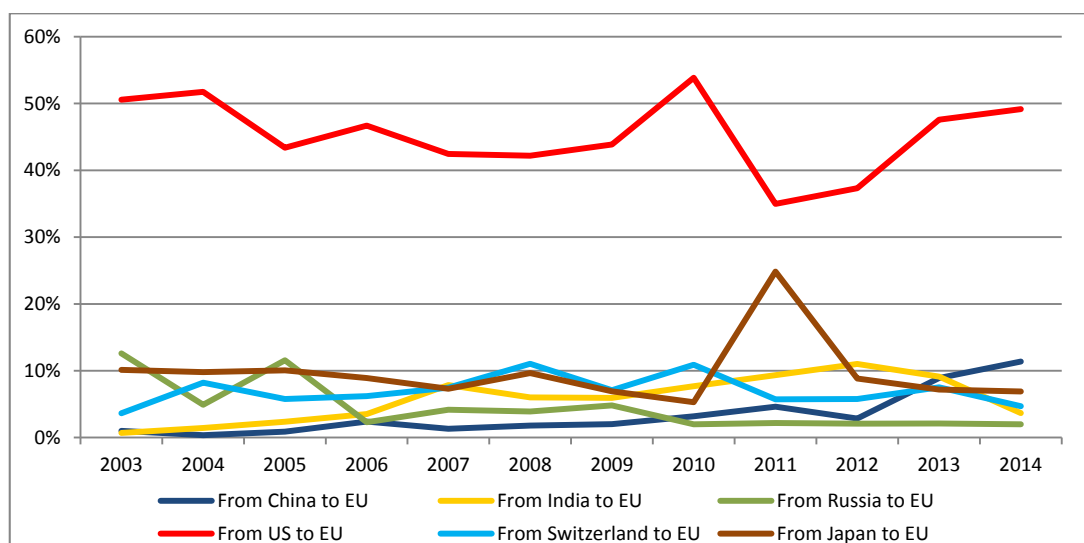
Source: Financial Times FDImarkets

### The US is the largest investor from outside the EU

Zooming into extra-EU greenfield FDI inflows into European economies, the US is the largest investor in the EU, accounting for around 50% of total extra-EU greenfield FDI inflows, followed by China, Japan, Switzerland and India (see Figure 5). China has been steadily increasing its share over the last years, from a share close to zero in 2003 to more than 10% in 2014. It has thereby surpassed Japan, India and Russia. The main EU recipient of Chinese greenfield FDI is the UK (accounting for 50% of Chinese FDI into the EU). These patterns show that there is a growing volume of investments coming from new sources of FDI such as China and India. These countries are becoming increasingly active in Europe through FDI, and not only via exports. As signalled by Coconi, Sapir and Zanardi (2010), this is a natural path in which FDI follows previously developed export activities.

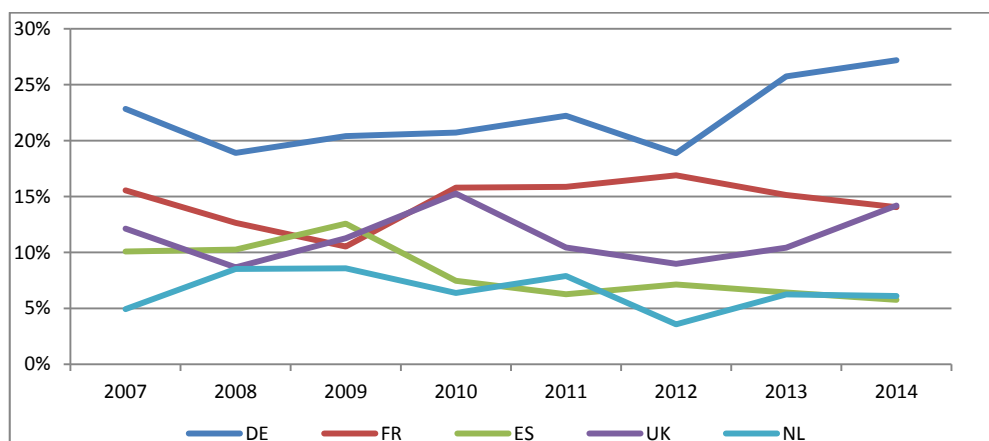
Nevertheless, despite the more intensive investment activity coming from these emerging countries, the general trend in greenfield inward FDI to EU is still driven by traditional investors: US and main European investors DE, FR, UK, NL and ES (see Figure 6).

**Figure 5 Extra-EU Greenfield FDI into EU countries by country of origin over total extra-EU Greenfield FDI into EU (%)**



Source: Financial Times FDImarkets

**Figure 6 Intra-EU Greenfield FDI by top countries of origin over total intra-EU Greenfield FDI into EU (%)**



Source: Financial Times FDImarkets

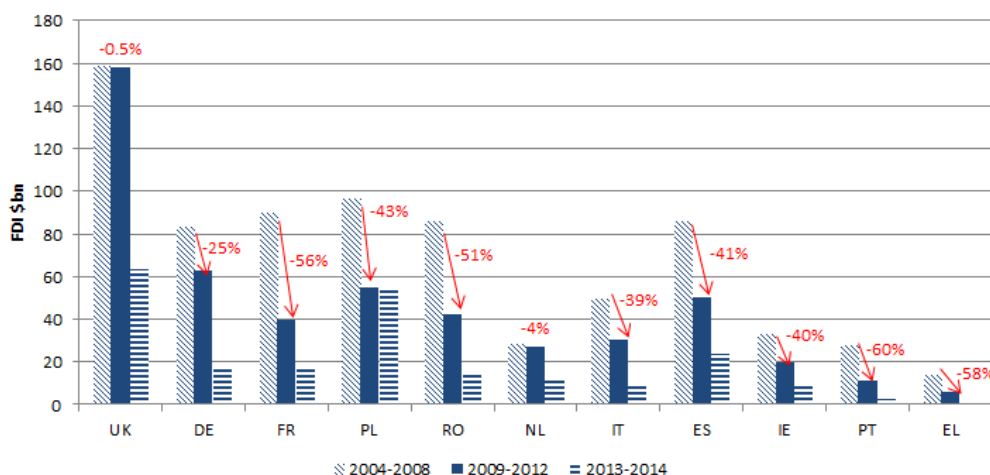
**Greenfield FDI is currently below pre-crisis levels in most EU countries**

Flows are very volatile from year to year which makes the analysis of short-term developments in FDI difficult. To reduce this volatility, we show in Figure 7 greenfield FDI for 3 sub-periods, coinciding with the pre-crisis period (2004-2008), the global and EA crisis (2008-2012), and the recovery years (2013-2014). The figure shows the sum of the country's investment inflows over the selected periods. During the economic recession the volume of investments fell well below pre-crisis levels, except for the UK, and the recovery over the 2013-2014 period seems to be modest.

If the economic recession had been the only explanation for the decline of greenfield FDI, one could expect these declines to be concentrated in the sub-set of EU countries that have been through financial market stress and/or under financial assistance (e.g. Ireland, Greece, Portugal and Spain). This has, however, not been the case. Figure 7 shows that the decline in greenfield FDI has also been concentrated in some of the traditional main FDI recipients (DE and FR) and largest economies. This seems to suggest that there are other factors, besides the Great Recession and systemic shocks hitting the euro area, behind the collapse in greenfield FDI.

In addition, the decline in greenfield FDI since 2008 does not have a cyclical pattern which would have meant a sharp decline in 2009 followed by a recovery in 2010, a further sharp decline in 2011-12 and a recovery in 2013 or 2014. This aspect seems to suggest that some deeper structural factors are at play.

**Figure 7 Evolution of Greenfield FDI inflows in the main EU recipients and countries with difficult economic conditions.**



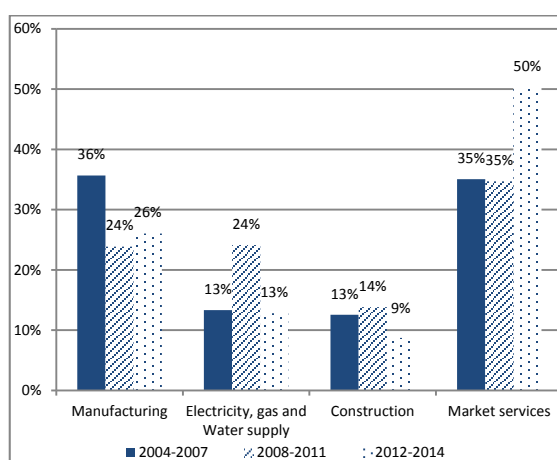
Source: Financial Times FDImarkets

Note: Each bar represents the sum of FDI inflows over a period indicated in the chart. In red the percentage change of FDI inflows per country over the first two periods (2004-2008 and 2009-2012).

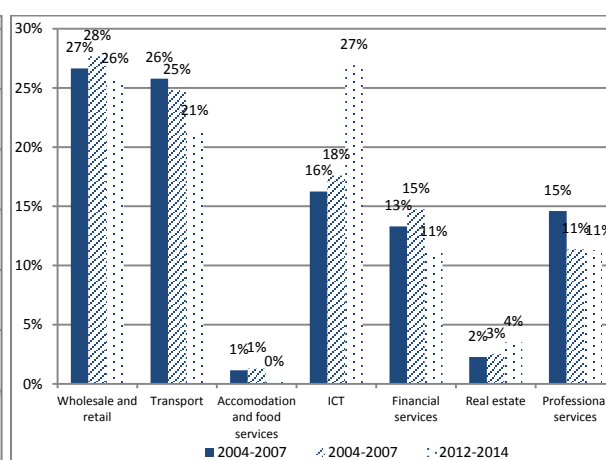
## At sectoral level, market services, and in particular ICT activities, attracted most greenfield FDI

The FDImarkets dataset allows for an in-depth sectoral analysis of greenfield FDI allocation, enabling us to identify which sectors have been hit harder and which ones have performed better. Figure 8 shows the sectoral composition of greenfield FDI inflows in the three sub-periods. Before the crisis Manufacturing attracted the largest share of FDI. Whereas this sector still remains an important recipient of greenfield FDI flows, its share has diminished and has been surpassed by Market services. Indeed, in the post-crisis years market services witnessed an impressive increase in terms of their share in total greenfield FDI inflows, reaching 50% of total FDI inflows. The network sectors electricity, gas and water supply and the construction sector saw a decline in their share in total greenfield investments in the last period (compared with the crisis years). Figure 9 provides a more detailed breakdown for market services. It shows that the impressive expansion of its share in total FDI is driven by the strong growth in ICT activities.

**Figure 8 Share of Greenfield FDI inflows to EU countries in different periods of time**



**Figure 9 Share of Greenfield FDI inflows to EU countries of the different market services over total Greenfield FDI inflows on market services.**



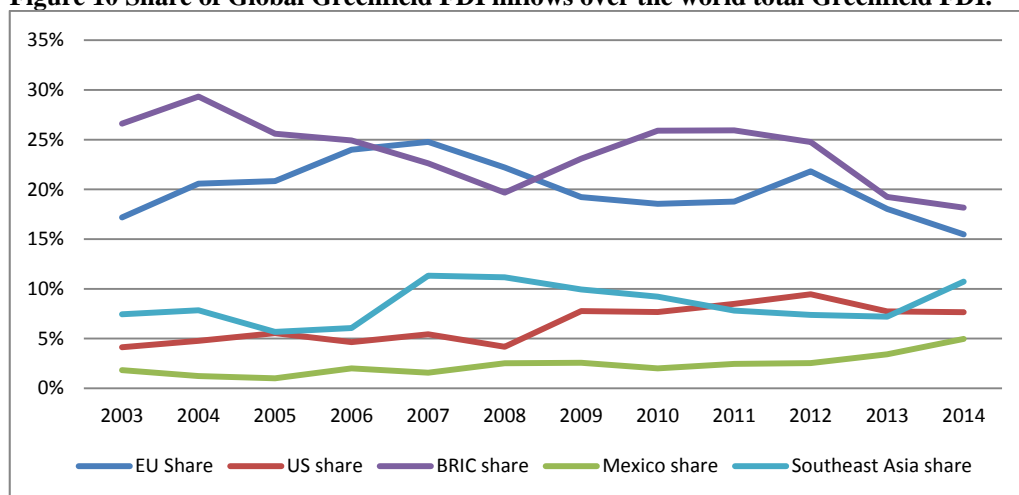
Source: Financial Times FDImarkets

Note: Market services include sectors G to N from NACE Rev. 2.

## EU's share in Greenfield FDI inflows in the world is decreasing

The allocation of greenfield FDI across some major regions in the world is shown in Figure 10. In 2014 around 15% of greenfield FDI was invested in the EU, against for example 10% in China and 7.7% in the US. Also, the trend in the share of the EU in world greenfield inflows is downwards, while the shares of China and the US are stable. The US in fact managed to expand their share in global greenfield FDI inflows since the onset of the crisis in 2008. It is noteworthy that the EU recovery was associated with a fall in the EU share. This is not only the case for the (ex-)programme countries and so-called Vulnerable Member States, but also for the traditional main recipients: Germany, France and Spain (see Figure 4). So the question is then why is Europe becoming structurally less attractive.

**Figure 10 Share of Global Greenfield FDI inflows over the world total Greenfield FDI.**



Source: Financial Times FDImarkets

Note: Southeast Asia area includes Vietnam, Thailand, Indonesia, Singapore and Malaysia

To conclude, international investments collapsed during the global financial and economic crisis. Today, greenfield FDI flows remain 50% below the peak levels reached in 2008. Nonetheless there have been significant differences between countries and regions. European countries (with the exception of UK) saw the biggest decline while the US is experiencing a quick recovery. It would therefore not be accurate to view the large decline of FDI flows into European countries as a purely cyclical or crisis-related phenomenon. In addition, some EU countries were not able to attract substantial FDI flows even before the crisis. A more appropriate explanation is that the low inflow of investments into Europe may be linked to structural competitiveness deficits.<sup>5</sup> Therefore, more FDI could be attracted through improvements in the business climate.

Indeed, the environment in which businesses operate is particularly relevant for investment decisions. This is particularly true for greenfield investments decisions as they generally reflect long-term strategic planning. Measures to reduce red tape and improve the regulatory framework could foster investment, and thus lift growth in the long run, but also boost economic activity and help the recovery in the short run. This has important implications for formulating appropriate policy responses to get Europe back on a healthy investment path.

<sup>5</sup> Other factors could also be at play, such as institutional weaknesses as well as low growth prospects resulting from weak structural competitiveness and institutional deficits. The analysis of the institutional weaknesses goes beyond the scope of this study.

### 3. DESCRIPTION OF THE VARIABLES

This section introduces the variables to be used in the regression framework, and presents the conjectured empirical relationships with foreign direct investment. Different researchers propose different models and variables when investigating the determinants of FDI (Kox and Lejour, 2006; Walsh and Yu, 2010). The inclusion or exclusion of certain variables could influence the results of the analysis. This paper distinguishes three broad categories of FDI determinants: distance variables, policy variables and other control variables.

#### A. DISTANCE VARIABLES

The literature points at the importance of distance in explaining FDI flows. In this study we use both geographical distance and cultural distance. Following Belot and Ederveen (2012), we proxy cultural distance by linguistic distance and religious distance. Geographical distance is defined as the distance (in km) between the capitals of two countries<sup>6</sup>. In the econometric analysis it will be assumed that these distance variables matter for the extensive margin, i.e. whether or not to undertake an FDI project.

#### B. POLICY VARIABLES (REGULATION AND BUSINESS ENVIRONMENT)

Regarding policy variables the analysis includes indicators on regulation and on the business environment.

##### *Product Market Regulation indicators*

The regulatory level in the economy can be proxied using the OECD Product Market Regulation composite indicator<sup>7</sup> (in the following, PMR indicator), whose value spans from 0 to 6 (a low value corresponds to light regulation). There are two types of PMR indicators: the economy-wide indicator and the sector indicators. The economy-wide indicator covers regulations in the following areas: state control of business enterprises, barriers to entrepreneurship and barriers to international trade and investment. It is updated every five years and currently covers the years 1998, 2003, 2008 and 2013. The sectoral PMR indicators cover professional services, retail distribution and network sectors (for additional information on this indicator see Annex 1).

In this study both indicators are used, though in different equations. First we analyse the impact of some of the sub-indicators of the economy-wide regulatory environment on greenfield FDI flows. The sub-indicators included are in our view the most relevant for FDI, namely "regulatory protection of incumbents" and "other barriers to trade and investment" (see Table 1 for the description of the sub-indicators selected). The sub-indicator "explicit barriers to trade and investment" was not included in the analysis given that such variable was close to zero during the period analysed and has shown little variation. If included in the analysis, it would feature a lack of potential explanatory power.

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<sup>6</sup> Taken from <http://privatwww.essex.ac.uk/~ksg/data-5.html>.

<sup>7</sup> For detailed information about the OECD indicators and its components see

<http://www.oecd.org/eco/reform/indicatorsofproductmarketregulationhomepage.htm>.

**Table 1 Regulatory protection of incumbents and other barriers to trade and investment indicators**

Regulatory protection of incumbents	Legal barriers to entry	Pervasiveness of barriers to entry in 30 business sectors as a share of sectors in which there are explicit legal limitations on the number of competitors.
	Antitrust exemptions	Scope of exemptions from competition law for public enterprises.
	Barriers in network sectors	Entry barriers in 8 network sectors (gas, electricity, water, rail transport, air transport, road freight transport, postal services and telecommunication) and degree of vertical separation in 3 network sectors (gas, electricity and rail transport).
Other barriers to trade and investment	Differential treatment of foreign suppliers <sup>8</sup>	Discrimination of foreign firms with respect to taxes and subsidies, public procurement, entry regulation and appeal and procedures.
	Barriers to trade facilitation	Recognition of foreign regulations, use of international standards and international transparency of domestic regulation.

Source: OECD

### *Business environment*

The business environment in the host country can also be an important determinant for the FDI decision. To that end we make use of the World Bank Doing Business indicators. Most of the indicators of the WB Doing Business database are not included in this study due to limited perceived relevance (e.g. cost of getting electricity, of resolving insolvency) and due to potential multicollinearity. In the empirical analysis we have used the cost of enforcing contracts and the ease of paying taxes (see Table 2 for additional information).

**Table 2 Definition of WB Doing Business indicators used in the analysis**

Cost of enforcing contracts	The cost of court fees and attorney fees, where the use of attorneys is mandatory or common, expressed as a percentage of debt value
Ease of paying taxes	Defined as total number of payments per year. The indicator reflects the total number of taxes and contribution paid, the method of payment, the frequency of payment, the frequency of filing and the number of agencies involved.

Source: World Bank Doing Business

## **C. OTHER CONTROL VARIABLES**

### *Market size*

Market size as measured by GDP, GDP per capita or GDP growth is a robust FDI determinant in econometric studies. Intuitively this appears reasonable. FDI will move to countries with larger and expanding markets and greater purchasing power, where firms can potentially receive a higher return on their capital. In the analysis we use the level of GDP to capture market size.

### *Productivity*

Regarding the role of productivity, different perspectives can be taken. The productivity level in the sending country can be an important determinant, as one would expect the most productive firms to engage in FDI. Indeed, foreign enterprises generally have shown higher productivity and more dynamic sales than their domestic counterparts (Aghion and Carlin, 1997). This stems from their more efficient technological processes and improved corporate governance. According to this view, the more advanced technology of foreign firms is expected to spillover into the domestic economy. As a matter of fact, FDI has been found to represent an important vehicle for the transfer of technology, provided that the host country has a

<sup>8</sup> Including intra-EU differential treatment of suppliers.

minimum threshold of human capital (Borensztein et al., 1998) leading to increases in productivity in the host country. Another perspective would be the productivity level in the host country. Here the sign of the relationship is less clear. For example if labour productivity in the host country is low because capital is relatively scarce, then the marginal return to capital is relatively high and FDI is attractive. This mechanism would predict a negative association between FDI and labour productivity. A positive relationship can occur if labour productivity reflects factors conducive for investments, such as market size and framework conditions to operate a business.

#### *Unemployment*

The literature also points at the role of business cycle conditions for the investment decision. In our empirical analysis we include the unemployment rate in the recipient country to capture cyclical conditions. A low unemployment rate can flag an expanding economy with ample investment possibilities. On the other hand, if FDI also requires lengthy start-up procedures, market research, and learning time, it can be argued that this type of investment could better be done during economic downturns, as the opportunity costs of these start-up costs are relatively low (in terms of foregone production time). Thirdly, from the perspective of the sending country it can be added that firms often withdraw their FDI projects in bad times, and return their capital to the home market (as a "safe heaven").

#### *Human capital*

To capture the human capital stock in the recipient country, we have included the tertiary education level. This goes back to the work of Lucas, where he considers the role of human capital in explaining why capital does not flow from rich to poor countries (Lucas, 1990). Excluding human capital from the analysis would then imply in a neoclassical economy that poor countries attract FDI as the marginal product of capital is high when capital is scarce and average incomes are low. However, Lucas argued that the marginal product of capital can be low in poor countries if the stock of human capital is low. The testable hypothesis here is that human capital should contribute positively to the attraction of FDI.

#### *FDI in Euro Area*

Being part of a common currency area could have an impact on the inflow of foreign direct investment. From an economic perspective, the common currency is supposed to enhance the free movement of capital which is a fundamental principle of the EU. At the same time, it would promote trade through diminishing transaction costs resulting from the elimination of exchange rate volatility (Rose 2000). The literature studying the link between the euro and FDI finds a significant positive impact of the euro on FDI (Buch et al. 2003, De Sousa and Lochard 2006). Though there is no accordance regarding the size of the effect. In our study we have included a dummy variable taking value 1 if the FDI project is in a euro area country, and 0 otherwise in order to investigate whether sharing a common currency has an impact on the inflow of greenfield FDI.



## 4. METHODOLOGY AND RESULTS

### A. THE HECKMAN SELECTION MODEL

Impact on greenfield FDI is estimated in a bilateral setup where each observation is a flow from country of origin to country of destination in a specific sector<sup>9</sup> and year. The empirical strategy is based on a "gravity model", augmented with policy indicators in order to examine the impact of barriers in the destination countries on FDI flows.

As mentioned earlier the dimensions of our FDI data are bilateral country combinations, sector, and year. The FT dataset only includes observed investment flows. To consider all theoretically possible combinations, we have constructed a matrix based on 12 sectors, 28 receiving countries, 38 sending countries, and 15 years. We then fill the database with observed FDI flows matching the identifiers. A zero entry is included when no bilateral FDI flow is reported between two countries for a particular sector and year. In other words, we assume zero FDI in case of non-reported data. This might not be an entirely satisfactory solution to the problem of non-reported data since the missing values could be because either FDI is truly zero or because it is non-zero, but relatively small and escapes the statistical reporting or non-reported for other reasons. This approach yields many zero values for the variable of central interest, i.e. greenfield FDI for a certain sector and year.

It should be realised that these zero entries may be non-random and due to indivisibilities in the investment decision, for example related with the presence of fixed costs. Indeed, the existence of fixed setup costs of new investments introduces two margins of investment decisions. There is an **intensive margin** of determining the size of the FDI project, and an **extensive margin** related to the decision whether or not to invest in a greenfield project.

The two-fold nature of the FDI decision lends itself to the application of the Heckman selection model (Heckman, 1979). The Heckman's sample selection model allows for a two-stage decision process whereby entrepreneurs firstly decide whether to invest or not (extensive margin), and secondly how much to invest (intensive margin). The model works via estimating the determinants of the decision to invest (extensive margin equation) simultaneously with estimating the determinants of the levels of greenfield FDI (intensive margin equation), avoiding any bias involved if they were considered separately. The maximum likelihood estimation is employed.

The Heckman model is in principle a suitable model if there are variables that have a strong effect on the likelihood of investing (the so-called selection equation), but no effect on the level of investment (the so-called exclusion restrictions). In our model the distance variables are used as restriction variables (this is discussed further in the next section).

Extensive margin equation (also called selection equation):

$$\Pr(DumFDI_{odst} = 1 | X) = \Phi(X'_{odst}\beta)$$

where Pr denotes probability, and  $\Phi$  is the Cumulative Distribution Function (CDF) of the standard normal distribution. DumFDI is a dummy variable for greenfield FDI taking value 1 if positive expenditure on greenfield projects are observed and zero otherwise. On the right-hand side we include the logarithm of geographical distance and cultural distance (proxy by linguistic distance and religious distance), the logarithm of GDP in the receiving country, the logarithm of sectoral labour productivity in the receiving country, the unemployment rate in the receiving country, the tertiary education level in the receiving country, a dummy taking value 1 if the receiving country is member of the Euro area, the four policy indicators introduced above, and dummies for the sending countries, sector and year. Or, more formally,

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<sup>9</sup> The financial sector is not included in the analysis given the special characteristics of the sector that are not captured by the business environment and regulatory indicators.

$$X'_{odst}\alpha = \alpha_0 + \alpha_1 \ln(kmdist_{od}) + \alpha_2 \ln(lingdist_{od}) + \alpha_3 \ln(reldist_{od}) + \alpha_4 \ln(GDP_{dt}) + \alpha_5 \ln(labprod_{dst}) \\ + \alpha_6 \ln(unemp_{dt}) + \alpha_7 \ln(tertiary_{dt}) + \alpha_8 EA_d + \alpha_9 PMR_{dt}^{incumbents} + \alpha_{10} PMR_{dt}^{trade} \\ + \alpha_{11} DB_{dt}^{contracts} + \alpha_{12} DB_{dt}^{taxes} + \alpha_{13} d_o + \alpha_{14} d_s + \alpha_{15} d_t + \varepsilon_{odst}$$

where  $\varepsilon$  is the error term.

Intensive margin equation (also called outcome equation):

$$\ln(FDI_{odst}) = \beta_0 + \beta_1 \ln(GDP_{dt}) + \beta_2 \ln(labprod_{dst}) + \beta_3 \ln(unemp_{dt}) + \beta_4 \ln(tertiary_{dt}) + \beta_5 EA_d \\ + \beta_6 PMR_{dt}^{incumbents} + \beta_7 PMR_{dt}^{trade} + \beta_8 DB_{dt}^{contracts} + \beta_9 DB_{dt}^{taxes} + \beta_{10} d_o + \beta_{11} d_s \\ + \beta_{12} d_t + \varphi_{odst}$$

The first equation describes the extensive margin of the FDI decision, and is estimated as a probit regression. The second equation describes the level of investments. The distribution of the error terms ( $\varepsilon$ "odst" ,  $\varphi$ "odst") is assumed to be bivariate normal with correlation  $\rho_{\varepsilon\varphi}$ . The two equations (i.e. decisions) are related if  $\rho_{\varepsilon\varphi} \neq 0$ . In this case estimating only the intensive margin equation would induce sample selection bias in the estimation of the regression coefficients ( $\beta$ ) since the error term  $\varphi$  and the regressors of the intensive margin equation would be correlated.

As far as the explanatory variables in the equation are concerned, we have included in the extensive margin equation distance variables as suggested in the gravity equation literature. Distance between host and source country assumes a broad meaning, not only geographical (the logarithm of the distance between the two countries' capitals in kilometres), but also linguistic and religious distance (both taken from Belot and Ederveen, 2004). Linguistic and religious distance between two countries is measured on a scale from 0 to 1.

Regarding the other explanatory variables, following the approach in Kox and Lejour (2006), we decided to include a series of variables describing the situation in the FDI receiving countries, while for the FDI sending countries we include country dummies capturing time-invariant unobserved heterogeneity. The reason is that our main interest is to investigate whether regulatory barriers and other aspects of the business environment in the host economies have a detrimental impact on greenfield FDI. Including also country fixed effects for the host economies would cause multicollinearity problems.

Regarding the economic control variables, we included the logarithm of GDP, sectoral labour productivity, the unemployment rate, the fraction of tertiary education graduates in the population, and a dummy if the host country is a member of the Euro Area.

To describe the host country's business environment, we include PMR<sup>10</sup> data from the OECD and the World Bank.

Finally, the equation includes dummy variables to capture sector, year, and investing countries' fixed effects.

In short, the main difference between the two equations (selection and outcome equation) is that the selection equation includes the distance variables (geographic distance between the capital cities, the linguistic distance, and the religious distance) as exclusion restriction variables. As for the policy and other control variables, all are included in both equations.

The regression is estimated for a panel with a large cross sectional dimension (origin countries  $\times$  destination countries  $\times$  sectors) and for the time 2004-2014. Theoretically we would have 21,869 observations but because of missing data in the set of explanatory variables the final number of observations available for the econometric analysis is more limited.

<sup>10</sup> To have a coherent match between the macro-economic/structural statistics data and the PMR data, we have calculated the PMRs for 2004-2013 using a linear interpolation procedure (using 2003, 2008 and 2013 as the three points of observation).

### Box 1: Some methodological issues: Why Heckman model?

The greenfield FDI dataset constructed for this study captures bilateral flows where zero-value observations are frequent. A first approach developed in the empirical literature is to estimate a log-linearized model using the Ordinary Least Squares (OLS) estimator. In this case, zero-value observations would be dropped from the estimation. However, zero entries may be non-random for instance in the presence of investment indivisibilities and fixed costs. In that case the elimination of the zero-values leads to sample selection bias and biased OLS estimation parameters. (see Razin, Sadka (2005) for a discussion of these issues in bilateral FDI models).

Various methods have been used in the empirical literature to overcome this problem. For instance, simply replacing the zeros with a small positive value. This seems to represent an ad-hoc method that could lead to biased coefficients if the equation is estimated using OLS.

Kox and Lejour (2006), when estimating the impact of regulation in bilateral direct investment, used OLS with fixed effects and the seemingly unrelated regression SUR method with the transformed variables (DM ) as estimation methods. The latter method is used to test for possible unobserved variables in the bilateral relations between FDI partner countries.

Censored data, such as the Tobit model with a left censoring limit at zero have been used extensively in the literature and seem appropriate (see Eaton and Tamura, 1994, Dabla-Norris et al 2010). In this type of model, the observations that are not observable are recorded as zero as they are assumed non-random.

An alternative method was suggested by Santos Silva and Tenreiro (2006), estimating the gravity model from a non-linear form using the Poisson Pseudo Maximum Likelihood (PPML). The authors show that this method provides robust results in the presence of heteroskedasticity.

However, as expressed by Chiappini, 2014, the PPML method might not be appropriate if the probability of a positive value of FDI between two countries is correlated with unobserved characteristics of that country pair.

In such cases, the Heckman two-step selection procedure is better and it allows controlling for sample selection problems. In the present study the Heckman model is used to study the determinants of greenfield FDI flows into the EU. A Tobit model could also have been used, though as explained by Razin and Sadka (2006), the Tobit model is a special case of the Heckman model. In fact, it could be too restrictive because a single mechanism governs the selection equation ( $y=0$  versus  $y>0$ ) and the outcome equation (level of  $y$  if it is positive). The Tobit model is used in this study as a robustness test, or in cases where the tests performed to check for independent equations in the case of the Heckman model does not allow rejecting the null hypothesis of independent equations. See Razin and Sadka (2006) for a discussion on the advantage of employing the Heckman method over the Tobit approach.

## B. RESULTS

### *Basic model*

Table 3 shows the estimation results of the Heckman model, using the maximum likelihood strategy. The intensive margin equation is shown in column (1) and the extensive margin equation in column (2). In the Heckman model the set of explanatory variables cannot be identical in both equations, and we have decided to include the distance variables only in the extensive margin equation. The intuition is that distance is likely to mainly matter for the decision whether or not to invest in another country, and not so much for the size of the investment project. This is especially likely to be the case to the extent that distance is associated with fixed costs to enter a new market.

Results for the extensive margin equation show that the distance variables all matter for the decision whether or not to implement a greenfield FDI project in another country. The geographic distance between the capital cities, the linguistic distance, and the religious distance all appear with negative and statistically significant coefficients. Also the size of the receiving country (measured by the logarithm of its GDP level) appears with a statistically significant coefficient, and the results imply that greenfield investment projects are more likely to be undertaken in larger countries. The decision to undertake greenfield FDI projects is also positively affected by the quality of the labour force (as measured by the fraction of tertiary education graduates) in the receiving country. Labour productivity and the unemployment rate in the receiving country do not appear with significant coefficients in the selection equation.

Regarding the policy variables, the results in column (2) show that product market regulation does not seem to be associated with the decision whether to invest or not, while the cost of doing business does matter. In particular, the PMR sub-indicator on regulatory protection of incumbents and other barriers to trade and investment both appear with an insignificant regression coefficient in the extensive margin equation. The Doing Business indicators on enforcing contracts and paying taxes show up with statistically significant regression coefficients.

Column (1) gives the results for the intensive margin equation, i.e. the capital invested in the FDI greenfield project, conditional on the investment actually taking place. Here we leave out the distance variables from the equation, as we suspect that these distance variables may be relevant for the extensive margin of the investment decision (whether to invest or not), but not so much for the intensive margin (how much to invest). The size of the host country's economy again shows up with a positive and significant coefficient. Labour productivity and the human capital composition of the labour force appear with insignificant regression coefficients, while the unemployment rate now shows up with a somewhat counterintuitive positive regression coefficient (larger investment projects when the unemployment rate in the home country increases).

The Doing Business paying taxes variable appears with an insignificant regression coefficient, but the coefficients of the other three policy variables are all significant and with the expected negative sign.

**Table 3: Heckman Model ML**

VARIABLES	Intensive margin equation Ln(Capital expenditure)	Extensive margin equation Selection eq.
Ln(km distance)		-0.150*** (0.0263)
Linguistic distance		-0.308*** (0.0646)
Religious distance		-0.602*** (0.0571)
Ln(GDP) destination country	0.666*** (0.0354)	0.580*** (0.0175)
Ln(productivity) destination country	-0.0469 (0.092)	-0.0175 (0.0495)
Unemployment rate	0.0259*** (0.006)	0.00372 (0.0036)
Ln(Tertiary education)	-0.0222 (0.133)	0.275*** (0.0742)
EA countries	0.151 (0.156)	0.0211 (0.0802)
PMR Protection of incumbents	-0.545*** (0.195)	-0.0236 (0.122)
PMR Other barriers to trade and inv.	-0.840*** (0.117)	-0.0706 (0.0633)
Cost of enforcing contracts	-0.0276*** (0.0054)	-0.0263*** (0.0031)
Ease of paying taxes	-0.00778 (0.0066)	-0.0156*** (0.0035)
atrho		0.791***
lnsigma		0.408***
Observations		21,869
Censored observations		17,413
Investing Country FE		YES
Sector FE		YES
Year FE		YES

rho = estimate of  $\rho_{\varepsilon\eta}$  indicating the correlation coefficient between error terms

LR test of indep. Eqns. (rho=0):  $\chi^2(1) = 71.96$  Prob >  $\chi^2 = 0.000$

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The likelihood-ratio test (LR test) reported at the bottom of Table 1 is the comparison of the joint likelihood of an independent probit model for the extensive margin equation and a regression model on the observed data against the Heckman model likelihood. Because  $\chi^2 = 71.96$ , this justifies the Heckman selection equation with these data.

In order to interpret the parameters generated by the Heckman model as elasticities (or quasi-elasticities) we need to calculate the marginal effects, which can be conditional or unconditional depending on the assumptions made about the nature of zero-value observations. If zero FDI flows are "true" zeros, we rely on conditional marginal effects. If zero values are due to missing or misreported data, we rely on unconditional effects. In this study dataset the missing or non-reported data have been treated as zeros, therefore the unconditional effects have been computed (see Table 4).

The estimation of the elasticities confirms that greenfield FDI flows into EU countries are influenced by the regulatory environment of the destination country, as well as the host market size and the distance away. For instance, we find that greenfield FDI flows increase by 13% if the PMR indicator measuring protection of incumbents decreases by 1 point. Likewise, a decrease of 1 point of the PMR regulatory indicator measuring barriers to trade and investment would increase FDI flows by 22%.

**Table 4 Unconditional marginal effects using Heckman model**

Variable	
Ln(GDP) destination country	0.37153*** (0.0096)
Ln(productivity) destination country	-0.0241 (0.0323)
Unemployment rate	0.00720*** (0.0022)
Ln(Tertiary education)	0.0923** (.0484264)
EA countries	-0.0193 (0.04399)
PMR Protection of incumbents	-0.1353** (0.0708)
PMR Other barriers to trade and inv.	-0.2219*** (0.0456)
Cost of enforcing contracts	-0.0170*** (0.0021)
Ease of paying taxes	-0.0072*** (0.0023)
Ln(km distance)	-0.0595*** (0.0108)
Linguistic distance	-0.122*** (0.026)
Religious distance	-0.238*** (0.025)

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

These results led to the conclusion that, in addition to the macroeconomic conditions, the regulatory environment and business climate play an important role in the attraction of investments. The presence of high regulatory barriers and domestic regulations seem to prevent the entry of higher investment flows. Therefore an important determinant of investment patterns lies in domestic regulations and business environment.

#### *Analysis for selected sectors*

In the basic regression model we have used the economy-wide PMR indicator of the OECD. The regulatory indicator is also available at sectoral level, for a selection of sectors. We next analyse the earlier presented econometric relationship between FDI and its potential determinants per sector, for a number of network and services sectors.

In other words, the same equation presented in section 4.1 is used to estimate the impact of the regulatory barriers in different sectors, excluding the WB Doing Business indicators and replacing the economy-wide PMR indicator by the sectoral PMR regulatory indicator. The sectors analysed are: retail sector, telecom, transport and professional services (covering 4 professions engineers, architects, accountants and legal activities).

The Heckman model was run for all sectors. However, for all sectors except retail the LR test for independent equations shows that the null hypothesis that the equations are independent cannot be rejected. Therefore we decided to use the Tobit estimation method with a left censoring limit at zero for the telecom, transport and professional services sectors. The results of the regression are presented in Table 5 and Table 6.

**Table 5 Results for retail (Heckman Model)**

	<b>Intensive margin equation</b> Ln(Capital expenditure)	<b>Extensive margin equation</b> Selection eq.
PMR_Registration and licenses	0.0484 (0.102)	0.0254 (0.0727)
PMR_Special regulation of large outlets	-0.0975** (0.0485)	0.00636 (0.0389)
PMR_Protection of existing firms	-0.160** (0.0624)	0.149*** (0.0462)
PMR_regulation of shop opening hours	-0.127** (0.0534)	0.0258 (0.0432)
PMR_Price controls	-0.342* (0.191)	0.164 (0.155)
PMR_Promotion/discounts	0.245*** (0.0657)	-0.0631 (0.0535)
<hr/>		
atrho		-1.736*** (0.2019)
Insigma		.2780*** (0.0450)
rho		-0.939
Observations		1,919
Censored observations		1,321

Note: Similar control variables as in Table 1 are included.

rho = estimate of  $\rho_{\varepsilon\varphi}$  indicating the correlation coefficient between error terms

LR test of indep. eqns. (rho = 0): chi2(1) = 49.16 Prob > chi2 = 0.0000

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 6 Results for telecom, transport and professional services (Tobit Model)**

	Telecom	Transport	Professional services
PMR_Public Ownership	-0.199*** (0.066)	PMR_Transport -0.341** (0.170)	PMR_Entry regulation 0.148 (0.121)
PMR_Market Structure	-0.008 (0.309)		PMR_Conduct regulation -0.272** (0.136)

Note: Similar control variables as in Table 1 are included. Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The results for the retail sector, presented in Table 5, show for most of the PMR sub-indicators a negative association between regulation and FDI (intensive margin). The exception is the component related with promotion and discounts, which appears with a counterintuitive positive regression coefficient.<sup>11</sup>

For the telecom sector we first included sub-indicators on entry regulation, public ownership and market structure. The sub-indicator on entry regulation appears to contain many zero values, causing issues of multicollinearity; this sub-indicator has therefore been dropped from the analysis. We then find a negative and significant regression coefficient for public ownership and an insignificant association between FDI flows and the sub-indicator on market structure. For transport we find a negative relationship between FDI flows and the sectoral PMR. Lastly, for professional services, the OECD PMR regulatory indicator covers four professions: legal, accounting, architectural and engineering. It is an average of two more detailed (composite) indicators assessing the level of entry and conduct regulation. Typically market entry regulations are qualification requirements, such as formal certificates of qualifications (i.e. academic degrees, professional examinations), registration or membership in a professional body, and rules on areas

<sup>11</sup> We have tested whether this positive coefficient is due to multicollinearity problems by omitting the other PMR indicators from the regression equation, but then we still find a positive coefficient.

of reserved activity. Conduct regulations are regulation of prices and fees (fixed prices, minimum and/or maximum prices etc.), regulation of advertising, restrictions on inter-professional co-operation or restrictions on forms of business. Table 6 shows that entry regulation is not significant at conventional significance levels, whereas conduct regulation is. However an insignificant effect does not necessarily imply that future action in the field of entry regulation would not yield benefits, especially considering that it is still relatively strict in several Member States.

### *Sensitivity analysis*

In order to inspect the robustness of our main findings, we have carried out a series of sensitivity checks. These checks pertain to (i) the employed econometric strategy, (ii) the stability of the coefficients during the Great Recession, (iii) the inclusion of alternative control variables, and (iv) the use of an alternative dependent variable. In this sub-section we briefly report the main findings.

#### (i) Alternative econometric strategy: Tobit approach

Table 7 shows the results of a Tobit estimation, in order to inspect the differences with regard to the Heckman model presented in Table 3. The results are broadly comparable, though the Tobit model generates a counterintuitive negative regression coefficient for productivity in the destination country. The policy variables in the Tobit equation all appear with negative and statistically significant regression coefficients.

**Table 7: Tobit Model**

VARIABLES	
Ln(km distance)	-0.599*** (0.0784)
Linguistic distance	-1.608*** (0.189)
Religious distance	-2.029*** (0.180)
Ln(GDP) destination country	1.694*** (0.0523)
Ln(productivity) destination country	-0.333** (0.144)
Unemployment rate	0.0295*** (0.0104)
Ln(Tertiary education)	0.721*** (0.211)
EA countries	0.0576 (0.206)
PMR Protection of incumbents	-0.529* (0.355)
PMR Other barriers to trade and inv.	-0.304*** (0.108)
Cost of enforcing contracts	-0.0613*** (0.00946)
Ease of paying taxes	-0.0338*** (0.0110)
Total observations	21,869
Left-censored observations	17,413
Uncensored observations	4,456

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### (ii) Robustness of the coefficients during the Great Recession

In order to inspect whether the impact of the included policy variables on greenfield FDI has changed during the crisis period, we have included in Table 8 interaction terms between the policy variables and a



crisis dummy (taking value 1 for the years 2008 and later, and 0 otherwise). The empirical results show that these interaction terms show up with insignificant regression coefficients in the case of the PMR indicators, implying that the estimated impact of these policy variables does not systematically change during the crisis years. In the case of business environment indicators different results are found. Results for the intensive margin equation suggest that the negative effect of the cost of enforcing a contract on FDI flows found in "normal" times is further amplified during the crisis, as follows from the negative and significant coefficient of the interaction term. Regarding the ease of paying taxes, a negative effect is found during "normal" times but this effect vanishes during the crisis (the null hypothesis that the joint effect is zero cannot be rejected).

**Table 8: Heckman Model ML**

VARIABLES	Stability of coefficients	
	Intensive margin equation Ln(Capital expenditure)	Extensive margin equation Selection eq.
PMR Protection of incumbents	-0.497** (0.227)	-0.000299 (0.132)
PMR Protection of incumbents × crisis	-0.159 (0.372)	-0.106 (0.204)
PMR Other barriers to trade and inv.	-0.950*** (0.141)	-0.0971 (0.0769)
PMR Other barriers to trade and inv. × crisis	-0.0438 (0.188)	-0.0241 (0.101)
Cost of enforcing contracts	-0.0235*** (0.00733)	-0.0239*** (0.00408)
Cost of enforcing contracts × crisis	-0.0170* (0.00953)	-0.00799 (0.00527)
Ease of paying taxes	-0.0144* (0.00830)	-0.0166*** (0.00458)
Ease of paying taxes × crisis	0.0260** (0.0129)	0.00498 (0.00686)
atrho	0.8017 ***	
lnsigma	0.4106 ***	
Observations	21,869	
Censored observations	17,413	

LR test of indep. eqns. (rho = 0): chi2(1) = 74.79 Prob > chi2 = 0.0000

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(iii) The inclusion of alternative control variables

Our basic regression model is rather parsimonious, and can be extended by including additional covariates. We have run alternative specifications including other control variables proposed in the literature, namely openness of the country, the mobile penetration rate, and the bond spread. Results of this exercise are summarised in the table below. They all either have an impact on the intensive margin or on the extensive margin. For example, corruption exerts a negative impact on the amount invested in the project, but not so much on the incidence of greenfield FDI. Inclusion of these variables would leave our conclusions on the policy indicators largely intact. We however typically lose a substantial number of observations, and we therefore prefer to consider the regression shown in Table 3 as the preferred specification.

Control variable	Impact on intensive margin	Impact on extensive margin
Openness	+	0
Mobile penetration	0	+
Bond spread	0	-

Note: The control variables are defined as follows; Openness is the ratio of exports plus imports to GDP, the mobile penetration is the Subscriptions to cellular mobile services per 100 inhabitants, the bond spread is the spread of 10-year government bond yields relative to German bond.

Source: Eurostat

(iv) Creation of new jobs and number of greenfield FDI projects

Next to data on capital expenditure related with greenfield FDI projects the FT database also provides data on jobs created. We also ran the basic model with the logarithm of the number of jobs created as the dependent variable. The main conclusions still hold. Regarding the policy variables, in the selection equation again only the Doing Business indicators show up with significant coefficients, while in the outcome equation all policy variables except the paying taxes indicator appear with significant coefficients.

## 5. CONCLUSIONS AND IMPLICATIONS FOR POLICY

In this paper we have studied determinants of greenfield FDI in the EU over the 2003-2014 period. Bilateral FDI flows are constructed from Financial Times' FDImarkets project, containing greenfield FDI data at project level for a large set of countries. We have used these data at the sectoral level. Related studies often focus on total FDI, i.e. the sum of greenfield investment and M&A activities. An advantage of our focus on greenfield investment is that the projects represent direct additional capital in the recipient country, generating new jobs in the economy (whereas M&A activities essentially imply changes in ownership).

We have first presented some stylised facts on greenfield FDI in the EU. The main findings are that greenfield FDI is currently still below pre-crisis levels in most EU countries, that the UK – with its relatively light regulatory burdens on firms – is EU's main recipient of FDI, that market services attract most of the greenfield FDI, and that in a global perspective, the EU share in greenfield FDI is decreasing.

The global crisis might not be the only factor behind the investment collapse in Europe and its weak recovery. Some deeper structural factors, such as regulatory bottlenecks and the business climate, might also play a role. In order to investigate the role of policy we have developed an econometric model. The dependent variable is the greenfield FDI flow for a particular country pair (sending and receiving country) in a particular sector and in a particular year. Due to this detailed granularity of the data, positive FDI flows are only observed for a sub-set. We therefore employ a Heckman selection model, distinguishing between the extensive (the decision whether to invest or not) and intensive (say, the size of the investment project) margin of the investment decision.

The econometric analysis yields the following conclusions. The indicators for the intensity of product market regulation mainly matter for the intensive margin, the costs of contract enforcement matter for both the internal and external margin, and the paying taxes indicator mainly matters for the external margin. The results point at sizeable negative impacts of regulation on FDI flows. For example, a 1 point increase in the PMR indicator measuring protection of incumbents would be associated with a 13% reduction in greenfield FDI flows.

We derive from the results that the regulatory environment and the business climate have an impact on investment. The regulatory protection of incumbents in national markets, barriers to investment such as the differential treatment of foreign suppliers, the cost of enforcing a contract and the taxes and contributions paid to start and develop a business, all affect the environment in which businesses operate and influence investment decisions. In countries with relatively high regulatory bottlenecks, the level of foreign direct investment is lower. This analysis then shows the missed opportunities for attracting EU greenfield FDI, when countries decide not to pursue additional reform efforts that would deliver a more flexible regulatory environment.

Several extensions of the empirical analysis have been presented, including the separate estimation of the model for selected sectors (enabling us to include sector-specific product market regulation indicators as explanatory variables), and an inspection of the stability of the estimated relationships before and during the Great Recession. The main messages are not changed. In sectors relatively highly regulated and protected from external competition, there might be an untapped potential for attracting new investments. However these results should be interpreted more cautiously as for some specific barriers they are not always in line with prior expectations.

## REFERENCES

- Aghion, P and W Carlin, (1997), *Restructuring outcomes and the evolution of ownership patterns in Central and Eastern Europe*. OECD and Kluwer Academic Publishers.
- Azémar, C., and Desbordes, R. (2010), Short-run strategies for attracting foreign direct investment', *World Economy*, 33 (7). 928-957.
- Belot, M. and S. Ederveen (2012). Cultural Barriers in Migration between OECD Countries. *Journal of Population Economics* 25 (3), 1077-1105.
- Bertrand, Olivier, Katariina Nilsson Hakkala, Pehr-Johan Norbäck and Lars Persson (2012). Should Countries Block Foreign Takeovers of R&D Champions and Promote Greenfield Entry? *Canadian Journal of Economics* 45(3): 1083–1124.
- Borensztein, E, J de Gregorio, and J W Lee, (1998). *How does foreign direct investment affect economic growth?*, *Journal of International Economics*, vol. 45(1), pp. 115-135.
- Buch, C., Kleinert, J., & Toubal, F. (2003), Determinants of German FDI: New Evidence from Micro-Data, Economic Research Centre of the Deutsche Bundesbank, Discussion Paper 09/2003, 1-36.
- Carstensen K. and Toubal F., 2004. *Foreign Direct Investment in Central and Eastern European Countries: A Dynamic Panel Analysis*. *Journal of Comparative Economics*, 32, 3-22.
- Chiappini Raphael, 2014. *Institutional determinants of Japanese outward FDI in the manufacturing industry*. GREDEG WP N. 2014-11
- Coconi, Sapir and Zanardi (2010), *The Internationalization Process of Firms: from Exports to FDI*. ULB (ECARES).
- Copenhagen Economics, 2016. *Towards an FDI Attractiveness Scoreboard*. Study commissioned by the European Commission.
- Davies, R. B. and Desbordes, R. (2012), Greenfield FDI and Skill Upgrading (March 2012). CEPR Discussion Paper No. DP8912.
- De Sousa, J., & Lochard, J. (2006), Does the Single Currency Affect FDI? A Gravity-Like Approach, University of Paris, mimeo, 1-22.
- Devereux, M.P. and Griffith, R. (1998), *Taxes and the location of production: Evidence from a panel of US multinationals*, *Journal of Public Economics* 68, 335-367.
- Dunning, J. H. (1988). The Eclectic Paradigm of International Production - a Restatement and Some Possible Extensions. *Journal of International Business Studies*, 19(1): 1-31.
- Dunning, John H., 1993, *Multinational Enterprises and the Global Economy*. Addison Wesley.
- Dunning, John H., 2001. *The eclectic (OLI) Paradigm of International Production: Past, Present and Future*. *International Journal of Economics and Business*, Vol. 8 (July), pp 173-90.
- Eaton J. and Tamura A. 1994. Bilateralism and regionalism in Japanese and US trade and direct foreign investment patterns. *Journal of the Japanese and International economies*, 8 (4), pp 478-510.
- Florence Jaumotte 2004. *Foreign Direct Investment and Regional Trade Agreements: The Market Size Effect Revisited*. IMF Working Papers WP/04/206
- James P. Walsh and Jiangyan Yu, 2010. *Determinants of Foreign direct Investment: A sectoral and institutional approach*. IMF Working Paper WP/10/87.
- Kox H. and Lejour A., 2006. *The effects of the Services Directive on intra-EU trade and FD*. Presses de Sciences Po (P.F.N.S.P.) 2006/4 - Vol. 57
- Krugman P., Venables A. 1995. *Globalization and the Inequality of Nations*. *The Quarterly Journal of Economics*, Vol. 110, No.4, 857-880.
- Lucas, R.E. (1990), "Why Doesn't Capital Flow from Rich to Poor Countries?", *The American Economic Review*, Vol. 80, No. 2, Papers and Proceedings of the Hundred and Second Annual Meeting of the American Economic Association (May, 1990), pp. 92-96.

- Mundell R. 1957. *International Trade and Factor Mobility*. The American Economic Review, Vol. 47 No.3, 321-335.
- Nath H. K., 2009. *Trade, Foreign Direct Investment, and Growth: Evidence from Transition Economies*, Comparative Economic Studies, 51(1), 20-50.
- Lionel Fontagné, Amina Lahrèche-Révil. 2004. *How Does FDI React to Corporate Taxation?* OECD
- Olivia Galgau and Khalid Sekkat, 2004. *Does Economic integration affect FDI inflows to member countries equally? An empirical analysis for Europe*. Working Paper: WP-CEB 04/025.
- Pablo M. Pinto and Boliang Zhu, 2013. *Fortune or Evil? The effect of inward Foreign Direct Investment on Corruption*.
- Razin A., Sadka E., Tong H. 2005. *Bilateral FDI flows: Threshold barriers and productivity shocks*. National Bureau of Economic Research, Cambridge. Working Paper 11639
- Rose, A. K. (2000), *One Money, One Market: Estimating the Effect of Common Currencies on Trade*. Economic Policy 15 (30), 7-46.
- Santos Silva, J.M.C. and Tenreyro S. (2006). *The log of gravity*, Review of Economics and Statistics 88(4), pp 641-658.
- UNCTAD (2000). *World Investment Report 2000: Cross-border Mergers and Acquisitions and Development*. New York and Geneva: United Nations.
- UNCTAD (2014). *World Investment Report 2014: Investing in the SDGs: An Action Plan*. New York and Geneva: United Nations.
- Zwinkels, R.C.J., Beugelsdijk, S. (2010), Gravity Equations: Workhorse or Trojan Horse In Explaining Trade and FDI Patterns Across Time and Space?, International Business Review, Vol. 19 (1): 482–497.

## ANNEX

**Table 1. Sectors included in the study**

Code NACE Rev.2	Economic activity
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage; waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transporting and storage
I	Accommodation and food service activities
J	Information and communication
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities

**Table 2. Countries included in the study**

Countries inside the EU (included as country of origin and destination)	Countries outside the EU (only included as country of origin)
Austria	Australia
Belgium	Brazil
Bulgaria	Canada
Cyprus	China
Czech Republic	India
Germany	Japan
Denmark	Norway
Estonia	Russia
Greece	South Korea
Spain	Switzerland
Finland	United States
France	
Croatia	
Hungary	
Ireland	
Italy	
Lithuania	
Luxembourg	
Latvia	
Malta	
Netherlands	
Poland	
Portugal	
Romania	
Sweden	
Slovenia	
Slovakia	
United Kingdom	

**Table 3. List of variables included in the Heckman model**

Group and variables	Data source
<i>Distance variables</i>	
Simple distance between capitals (capitals, km)	Belot and Ederveen
Language	Belot and Ederveen
Religion	Belot and Ederveen

*Control variables*

Real GDP of the destination countries	Eurostat
Labour productivity at sectoral level of the destination countries	Eurostat
Unemployment rate of the destination countries	Eurostat
Tertiary education graduates in the destination countries	Eurostat
Dummy, 1 if the country of origin and destination belong to the Euro area	

*Regulatory variables*

PMR Regulatory protection of incumbents	OECD
PMR Other barriers to trade and investment	OECD

*Business environment*

Cost of enforcing contracts	World Bank Doing Business
Ease of paying taxes	World Bank Doing Business

**Table 4. OECD PMR indicator at sectoral level**

<b>Regulatory indicator</b>	<b>Description</b>
<i>Retail</i>	
PMR_Registration and licenses	Registration, Licenses or permits are needed to engage in commercial activity
PMR_Special regulation of large outlets	Thresholds surface limits at which regulation of large outlets applies.
PMR_Protection of existing firms	Products that can only be sold in outlets operating under a local or national legal monopoly (franchise)
PMR_Price controls	Retail prices subject to price controls
PMR_Promotion/discounts	Restrictions of promotions and discounts
<i>Telecom</i>	
PMR_Public Ownership	Public authorities holding equity stakes in the largest firm in the sector
PMR_Market Structure	Competition in the market and market share of new entrants.
<i>Transport</i>	
PMR_Transport	Entry regulations, Public ownership, vertical integration, market structure and price controls.
<i>Professional services</i>	
PMR_Entry regulation	Exclusive rights, education requirements, quotas, compulsory chamber membership
PMR_Conduct regulation	Regulations on the form of business, on inter-professional cooperation, on advertising and on prices and fees,

Note: professional services sector covers four professions: legal, accounting, architectural and engineering activities.





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