

The Relationship between Foreign Direct Investments and EU Funding During the 2007–2013 Programming Period

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Abstract

The review of economic literature indicates that the 2007–2013 programming period has not yet been completely analyzed in terms of the EU funds and stock of FDI. Moreover, previous studies omitted most of the EU funds because they focused mainly on structural funds and cohesion funds. The main question of this paper is organized around whether there is a positive relationship between the stock of FDI and specific EU funds. We use a panel of 27 EU countries to analyze fifty policy variables from the 2007–2013 programming period with panel linear regression models. In contrast to analysis of previous programming periods, the results did not indicate that there was a statistically significant relationship between structural or cohesion funds and the stock of FDI. The results indicate instead that ceteris paribus FDI stock is influenced by EU funds for preservation and management of natural resources and the media 2007 programme. And more specifically that EUR 100 million increase of funds for preservation and management of natural resources increased FDI stock by 1,01%–2,02%. A one million increase of funds for media 2007 related programs increased FDI stock by 3,36%–4,29%. Additionally, the results indicate that there is an interaction between GDP per capita and funds for the preservation of animal and plant health, and GDP per capita with funds for solidarity and management of migration flows. This research is a pilot study. According to the author's knowledge this is the first analysis that takes into account all EU policy variables, and not just a selected few as well as the first study that analyses FDI and all EU funds during the 2007–2013 programming period.

Keywords: EU funds, Foreign Direct Investments, 2007–2013 programming period

JEL: F2, F36

Introduction

In the economic literature knowledge-intensive growth is often associated with the synergy of public and private investments. For instance, knowledge-intensive growth might come from the collaboration of state-funded and private Research and Development (R&D) companies. Economic development is often associated with spillovers coming from Foreign Direct Investments (FDI). Some authors suggest that there is a relationship between the European Union (EU) funded projects and the stock of FDI. They suggest that the relationship might come from the FDI response to improvements in the business climate. Previous analysis provides a lot of empirical evidence that EU institutions such as the European Single Market accelerate the flow of goods, services, and FDI. But perhaps, there is also a direct relationship between specific EU programs and FDI—not related solely to institutional factors but to specific EU funded projects—specific policies. In this paper, we explore the EU financial statement from 2007–2013 for information about inflows of EU funds to member states during the selected programming period. We use this data to investigate whether there is a relationship between specific EU policy and the stock of FDI.

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The main motivation for this study comes from Blomström's observation that FDIs are susceptible to echo or signal effects—the presence of investments attracts other Multinational Corporations (MNC).¹ Perhaps the same mechanism applies to EU funds and FDI. During 2007–2013 the world economy went through a process of accelerated fragmentation of production. MNC, especially from high-tech sectors, shifted different parts of production to different areas of the world—acting within the scope of global production chains. Many believe that this process will advance as long as the progress in production technologies will allow it and as long as there will be further reductions of barriers to trade. The EU is one of the most advanced regional integration agreements in the world with a nexus of agreements designated to facilitate free trade. From the MNC perspective the uniformization of institutions made by the EU enlargements is an important stimulus to invest overseas (Dunning 2000). However, for all we know, the EU influence on FDI can extend beyond the institutional nexus—perhaps even to the specific funding agenda—or specific capital.

EU funds have been traditionally associated with restructuring and implementation of national-level innovations. Perhaps MNCs tap EU funds to support their own goals. If so, the combined effect of MNCs' superior managerial efficiency and the EU investment agenda would in some cases accelerate the transition to a knowledge-intensive economy. Perhaps EU investment policies can be used to attract knowledge-intensive FDI (i.e., to attract advanced business processing centers or laboratories). The economic literature regarding FDI and the quality of institutions is vast and extends from scientific articles to numerous evaluation reports. However, according to the author's knowledge, there is no empirical research investigating in greater detail the relationship between specific EU funds and the stock of FDI in the Member States, for the programming period 2007–2013. This research aims to close this gap and provides results based on the panel data regression. The main contribution of this work in relation to previous analyses is two-fold. First, it provides findings for the previously not examined programming period 2007–2013. Second, it provides detailed analysis by taking account all EU funds—in contrast previous analysis focused only on cohesion and structural funds.

The paper is organized as follows. After this introduction, it presents a literature review which focuses on theoretical background regarding FDI location determinants and the role of EU funds in improving the investment climate. It also provides a review of empirical literature on how FDIs have been attracted by EU structural and cohesion funds for the periods 1970–1975, 1993–2003 and 2000–2005. Next, it presents the main hypothesis, data, methods and selected stylized facts about FDI and EU funds, and the results of regression and discussion. The last part is reserved for concluding remarks.

1 Literature review

The economic literature acknowledges the role of FDI as an important factor responsible for economic growth and somewhat advocates that it is likely that there is a relationship between FDI and EU funds. Most of the empirical research regarding EU funds concentrates primarily on the contribution of these funds to economic development. The review of empirical work regarding the EU funds and FDI relationship indicated that only a handful of papers approach the subject directly and none of them provide results for the EU programming period 2007–2013.

The review of the literature suggests that the base empirical model of FDI determinants should include GDP per capita—a proxy of the market size and the unit labor cost—a variable often used in the research about FDI location decisions and the most important variable affecting the allocation of EU funds to countries. The literature also suggests that the base model should include a proxy for an institutional regime such as the World Bank Government Effectiveness Indicator.²

1. See: Study on FDI and regional development. Final report. By Copenhagen Economics in cooperation with Professor Magnus Blomström, European Commission Directorate-General for Regional Policy, 22 December 2006, [@:] http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/fdi2006.pdf.

2. See: The Worldwide Governance Indicators: Methodology and Analytical Issues. Draft Policy Research Working Paper by D. Kaufmann and A. Kraay, September 2010, [@:] <http://info.worldbank.org/governance/wgi/pdf/wgi.pdf>. [The article was later published in *Hague Journal on the Rule of Law* (see: Kaufmann, Kraay, and Mastruzzi 2011)—Ed.]

Previous empirical analysis concentrated mostly on the relationship between FDI, cohesion and structural funds. But it is likely that there are also other EU funds that influence the stock of FDI.

We formulate the main hypothesis as follows. During the EU programming period 2007–2013, there was a positive relationship between specific policy funds and the stock of FDI and thus, we test all policy variables from EU revenue and expenditure statements from 2007–2013 for the relationship with the stock of FDI. The main argument here is that MNCs tap specific types of EU funds to lower the risk of investment.

1.1 Theoretical background

The contemporary theoretical framework for FDI dates back to the 1960s (Faeth 2009). The early studies focused particularly on market factors and trade barriers, and slowly shifted towards factors related to investment climate—according to Faeth the main contributors of FDI theory from the so-called “early period” are Kolde (1968) and Forsyth (1972). Faeth also states that the above-mentioned studies were based on the Heckscher-Ohlin (HO) model further modified by MacDougall (1960) and Kemp (1964) to include FDI. According to the early FDI studies capital was expected to move to countries with higher capital returns.

The next set of FDI theories focused on ownership advantages (Hymer 1976) and particularly on the situation where an MNE had monopolistic advantages—at a time it was known that MNCs are usually more efficient than domestic companies. Hymer’s theory of FDI advantages has been later revised by Knickerbocker (1973) and Vernon (1966); they suggested that investment decisions are related to various factors from the negotiation process with governments to “follow-the-leader” effects. At the time, development of global communication technologies had begun to significantly decrease the costs of long-distance management. The number of FDIs worldwide started to increase rapidly.

Further globalization accelerated research on FDI entry modes (i.e., through direct investment, trade, or licensing). Many countries engaged in agreements liberalizing international trade. FDI theories drew influence from transaction cost theory—particularly from internalization theory by Ronald Coase. The economic literature on MNC activity from that period was divided into several “points of view.” Later, those standpoints have been synthesized in the OLI (Ownership, Location, Internationalization advantages) paradigm or the eclectic paradigm by Dunning (1977). The OLI paradigm and particularly location advantages focused in great part on institutional factors of investment decisions. To cut a long story short, developments of the eclectic paradigm allowed for theoretical differentiation of investments into several groups: from resource-seeking investments to strategic-asset-seeking investments. The OLI paradigm is often extended to various theoretical frameworks that provide an explanation of changing organizational structures of FDI. For instance, theories that include knowledge capital originated from it—after MNEs started to share managerial knowledge with host countries.

The semiconductor revolution had a profound impact on FDI organizational structures which shifted from horizontal to vertical. Views and opinions on international trade have also changed over time—from protectionist to liberal. Nowadays, policymakers treat FDI as a source of industrial growth and support it with various incentives. FDI is one of the most “stable” components of capital flows that can bring technological progress through dissemination of managerial knowledge or for example through the implementation of improved production techniques. With the growing popularity of FDI among policymakers, empirical research on FDI shifted towards institutional factors—i.e., the quality of domestic institutions responsible for the efficient protection of civil and property rights or institutions that ensure economic freedom and protection from corruption. According to Acemoglu and Robinson (2012), those institutions are the key factor in explaining various cross-country differences, both in terms of growth rates and income per capita.

Various studies show that institutional determinants play a significant role in FDI inflows to developing countries (Benassy-Quere, Coupet, and Mayer 2007). The quality of institutions, and especially the negative changes in the economic regime create additional costs to FDI. For instance, negative changes increase corruption and sunk costs of investment.³ Institutional factors

3. See: Corruption in Economic Transition and Development: Grease or Sand? By Shang-Jin Wei, Draft for

can influence investment decisions in many other ways i.e. by reducing the red tape and regulatory burden (Benassy-Quere, Coupet, and Mayer 2007; Kaufmann, Kraay, and Zoido-Lobaton 1999). EU funds create institutional unity between member countries, therefore there is a good chance they reduce transaction costs. This is the main reason why shrinking institutional distance between countries stimulate investments (Benassy-Quere, Coupet, and Mayer 2007).⁴

1.2 Review of the empirical literature

Among other factors, the empirical research on FDI in the EU showed that investments have been driven by labor costs and the availability of educated specialists (Carstensen and Toubal 2004). According to Disdier and Mayer (2004), transition-specific factors—for instance, privatization policies and risk-reducing factors (i.e., cohesion programs)—might have created numerous positive spillover effects that lead to clustering effects and industry-specific agglomeration effects. Hence, the quality of institutions was a crucial factor that stimulated FDI.

Katsaitis and Doulos (2009) were convinced that structural funds improved the quality of institutions in most of the new member states and that they could have reduced barriers for FDI—such as corruption. On the other hand, they argue that some of the previous analysis of the aforesaid funds indicated that the effect on regional economic growth was negative thus suggesting that it should not be taken for granted that the relation between EU funds and FDI is inevitably positive. Breuss, Egger and Pfaffermayr (2010) tackle a similar problem, although from a different point of view and by applying different statistical methods. Empirical findings provided by Katsaitis and Doulos are based on the panel data model, whereas Breuss et al. apply the spatial econometric framework. Perhaps that is why they reach quite different conclusions. According to Breuss et al. the relation between structural and cohesion funds and FDI is positive while Katsaitis and Doulos state that it can be positive or negative depending on the institutional quality of receiving countries. Furthermore, Breuss et al. investigated the impact of structural funds on FDI during the EU enlargements. It is likely that during enlargements structural and cohesion funds are more significant for FDI than other EU investment policy tools.

Empirical research about EU funds by Basile, Castellani and Zanfei (2008) suggest that by helping to transform and modernize the infrastructure of developing EU regions, cohesion funds prepared them for the competition within the European Single Market and thus further influenced location decisions. They also suggest that this led to dramatic growth of MNE activities. Furthermore Basile et al. suggest that the positive effect of cohesion funds on FDI has been present in the peripheral regions. Churski and Perdał (2016) concur and add that within peripheral regions EU funds concentrate in privileged high-performance-regions.

Sustainable growth is one of the goals of the EU.⁵ In the literature, FDIs are usually treated as the complementary aftermath. As mentioned previously the role of EU funds is to prepare developing regions to withstand the competition from wealthier regions of Europe. The EU is influencing the development of a wide range of institutions that alter economic structures of its member states (Thomas 2013). In line with this argument, perhaps other EU funds, not just cohesion and structural funds, determine the stock of FDI.

2 Data and methods

We follow the research of Breuss et al. (2010) and for our dependent variable we use the FDI stock. To determine which EU funds stimulated FDI in the EU, we combined data from several sources—the EU 2007–2013 revenue and expenditure statement (in EUR), United Nations Conference on Trade and Development (UNCTAD) annual data about FDI for inward and outward stock

the UNECE Spring Seminar in Geneva on May 7, 2001, [a@:] <http://www.unece.org/fileadmin/DAM/ead/sem/sem2001/papers/Wei.pdf>.

4. The effect of institutional proximity on trade was studied through historical perspective—for instance in countries that developed during the colonial era—and those studies showed that investment decisions have been correlated with closeness of the market and legal regulations.

5. See: EUROPE 2020 A strategy for smart, sustainable and inclusive growth. COM/2010/2020 final.

(measured in USD at current prices) and Gross Domestic Product (GDP) at current prices (in EUR). We also use selected World Bank world governance indicators. Our panel is balanced and includes 27 countries⁶ of 7 observations each. Moreover, because data from UNCTAD was available only in USD and data on inflows of EU funds have been collected in EUR, we converted the first to EUR. We used exchange rates collected daily from European Central Bank (EBC) and applied average rates for the respective years.

The size of the panel is relatively small, therefore one potential problem in the case of heteroskedastic errors would be that individuals with large errors can dominate the fit. However, in our case, the size of the panel arises from the nature of the studied aspect—the analyzed programming period was planned from 2007 to 2013, and the number of countries was somewhat fixed. This situation, however, is not uncommon. Breuss et al. for instance also investigate programming periods as separate timespans. This comes from the reasoning that every programming period reflects the long-term EU strategic goals—these goals change and therefore we cannot simply add one programming period to another.

For the preliminary base model, we adopt some of the variables selected by Katsaitis and Doulos. We use GDP per capita as a proxy for size of the market, and unit labor cost – because it is “an important variable in FDI location decisions, especially if the product is at its maturity stage and competition is based mostly on cost and price” (2009, 567). Moreover, the GDP per capita is

Tab. 1. Descriptive statistics

Variable name	Variable description	Min	Q1	Median	Q3	Max	Lit ^a
fdi_stock	FDI stock (USD at current prices in millions converted to EUR with ECB rates)	7 689	38 834	97 887	274 794	1 138 870	n/a
gdp_percapita	GDP per capita (current prices, million EUR)	4,285	12,277	22,610	34,986	86,585	+
unit_labor_cost	Unit labour cost (based on hours worked, Index, 2010 = 100)	71,6	95,9	100,0	102,5	124,1	–
wgi_gef	Government efficiency indicator (effectiveness index) ^b	–0,359 7	0,707 3	1,156 3	1,592 6	2,354 0	+
coh_fund	Cohesion Fund (EUR million)	0,000	0,201	27,126	325,283	3 542,451	+/–
structural	Structural funds (EUR million)	13,36	197,90	422,26	1 990,68	7 318,93	+/–
man_nat	Preservation and Management of Natural Resources (EUR million)	6,556	367,084	1 060,103	2 658,027	10 360,076	?
media	Media 2007 (EUR million)	0,019 43	0,433 08	1,309 18	3,706 81	33,417 39	?
migration	Solidarity and management of migration flows (EUR million)	0,127	2,946	6,626	16,420	87,663	?

^aThe column presents potential impact of the variables on the dependent variable based on the review of economic literature. The sign “+” indicates stimulation and “–” destimulation of FDI; the sign “?” indicates lack of empirical research

^bSee: The Worldwide Governance Indicators..., op. cit.

Note: [In the journal European practice of number notation is followed—for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style).—Ed.]

6. Austria, Belgium, Bulgaria, Cyprus, Czech, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom; data for Croatia is available starting from 2013 therefore it was not included in the panel.

often associated with Dunning’s location advantages (Dunning 1977) and in line with the research of Acemoglu and Robinson (2012) we associate ownership advantages and internalization advantages with institutional quality. As a proxy for institutional quality we use the government effectiveness index.⁷ Our aim is to use a simplistic base model that corresponds with the fundamental principles of the OLI paradigm. Our list of policy variables included 50 EU funds that have been tested individually with the simplistic base model. Table 1 shows the descriptive statistics of the selected few plus the variables used for the base model. The full list of policy variables with descriptions in English, French and German is available online.⁸

The review of the economic literature provides in-depth information about the potential impact of the cohesion fund and structural fund on the stock of FDI. According to the author’s knowledge, most of the EU funds have yet not been tested for the relationship with the stock of FDI. This is the main reason why in the pilot study we decided to use a model linearly related to the parameters. The author realizes that dependencies may be non-linear. However, this will be the subject of future research.

We assume that there is unobserved heterogeneity across countries and use the individual-specific effects model that takes the following form:

$$(1) \quad y_{it} = \alpha_1 x_{it} + \alpha_2 z_{it} + \alpha_i + \varepsilon_{it}, \quad t = 1, 2, \dots, T,$$

where y_{it} is the natural logarithm of FDI stock (`fdi_stock`), x_{it} is a vector of controls, including natural logarithm of GDP per capita (`gdp_percapita`), unit labour cost index (`unit_labor_cost`) based on hours worked and government efficiency indicator⁹ (`wgi_gef`), z_{it} is a vector of various types of EU funds, α_1 and α_2 are estimated parameters, α_i represent the effects—fixed or random, and $\varepsilon_{it} \sim NID(0, \sigma_\varepsilon^2)$ is an error term. We tested for heteroskedasticity with the Breusch-Pagan test and autocorrelation with Breusch-Godfrey/Wooldridge test. Next, we applied the Lagrange multiplier test and the Hausman test to determine the effects. In our modelling strategy we add each EU fund to the base model and look for a statistically significant relationship with the FDI stock. We have also tested if EU funds affect the FDI inflow with a significant time lag, and we tested for potential interactions among EU funds and variables from the base model. Finally, we take groups of policy variables and add them to the base model.

3 Stylized facts about FDI and EU funds

According to Barry (2003, 189) “EU enlargement is not a zero-sum game in which the new member states will compete against current incumbents for a fixed pool of FDI.” The composition of cohesion investments in 2007–2013 in Central-Eastern, Western-, Northern- and Southern-European Economies of EU differed considerably. In CEE, EU investments have been used to support transport infrastructure—the only exception is Estonia where cohesion funds have been supporting mainly “enterprise environment” and innovation. In CEE only a relatively small portion of funds have been used to support human capital, except in Romania where cohesion funds supported training programs but did not support innovation activities—such as funds for modernization of production lines. In the west EU funds have been used to support mainly human capital and innovation or “enterprise environment.” And only a small percentage of EU funds have been used to support communication infrastructure.

Traditionally, implementation of structural and cohesion funds depends on the pattern of submission of payment requests. This also implies that it is not unusual to see large differences in EU expenditure between respective programming periods. For instance, in 2003 Greece received EUR 40,1 million and in 2007 EUR 4 591,0 million under the Cohesion Fund or Poland—in 2005 she received EUR 787,0 million and in 2007 EUR 4 217,1 million under the same EU fund.

7. See: The Worldwide Governance Indicators..., op. cit.

8. The data file is available at http://ec.europa.eu/budget/revexp/revenue_and_expenditure_files/data/revenue_and_expenditure_en.xls.

9. The author would like to thank an anonymous reviewer for the suggestion to include the cross-country indicators of governance proposed by Kaufman and Kraay (see: The Worldwide Governance Indicators..., op. cit.).

EU funds are often distributed to compensate for various natural disasters. EU solidarity fund payments (under “other internal policies”) for example, supported Germany in 2002 and in 2007 with EUR 444,0 million and EUR 166,9 million respectively to alleviate the effects of flooding or Spain and France that in 2004 received EUR 10,0 million to alleviate the effects of forest fires, and EUR 19,6 million to alleviate the effects of forest fires and flooding.

EU funds and institutions can also directly influence FDI with specific agencies. For instance, with the export refunds—most of them can be traced back to EU members from which the goods leave the EU—the so-called export gateways. This concerns notably Belgium, Denmark and the Netherlands, and particularly the harbors of Antwerp, Copenhagen, and Rotterdam.

The total stock of FDI—our dependent variable—for EU27 in 2013 was equal to EUR 6,2 trillion. Almost 1/3 of total EU27 FDI stock was invested in two countries—18,4% in the United Kingdom and 11,8% in Germany (fig. 2). The inflows of FDI to EU27 in 2007–2013, all things considered, grew 18,9%. However, because of the economic downturn, large swings were not uncommon in most of the EU27 countries. At the beginning of the financial crisis in 2008, the inflows of FDI decreased over EUR 696,9 billion in relation to 2007. Similarly, in 2011 they also decreased but not as sharply—0,5% in relation to 2010.

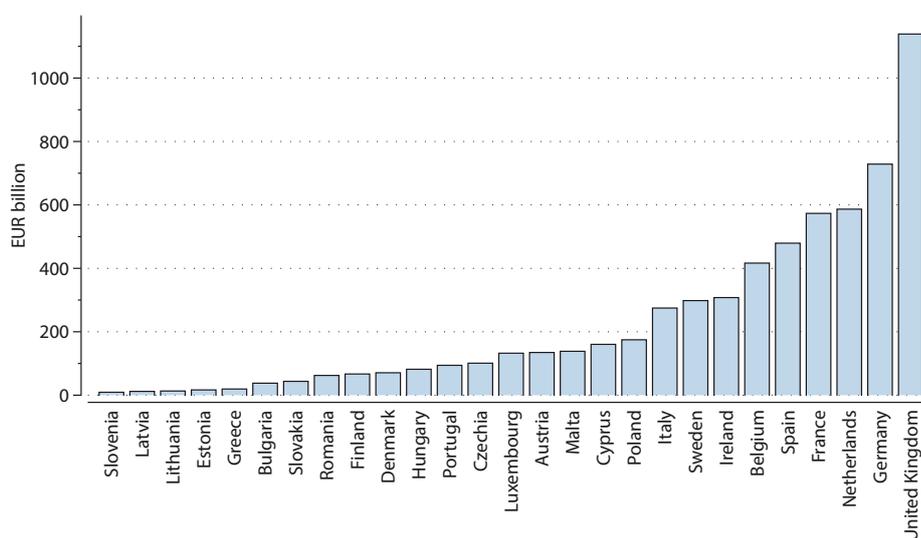


Fig. 1. Total FDI stock in the year 2013 by country

Data source: UNCTAD

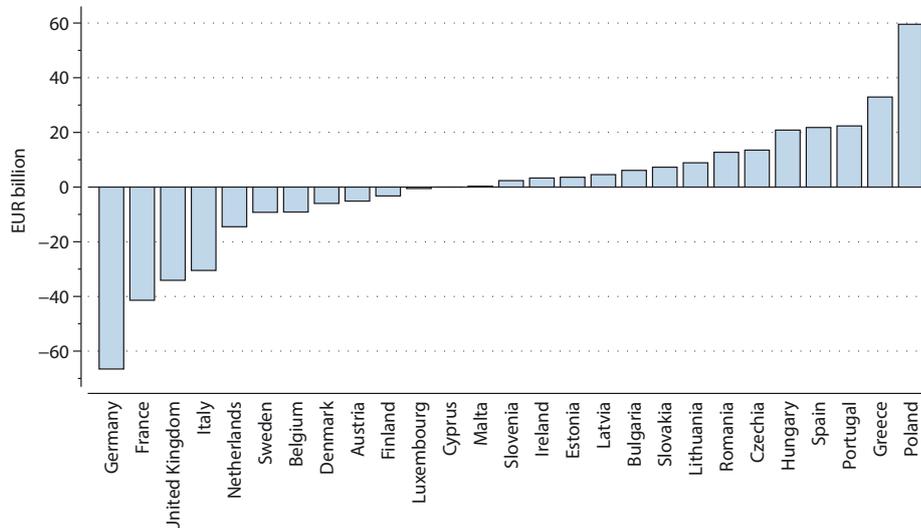


Fig. 2. Total operating budgetary balance in 2007–2013

Data source: EU revenue and expenditure statements

Because the flows of FDI are susceptible to the economic downturns, in almost all EU27 they have been significantly lower in 2008 and 2009 than in 2007. Luxembourg was one notable exception, which noted an outflow of FDI in 2007. After that, in 2008 FDI left Finland, Italy, Ireland, Netherlands, and Belgium. In 2009 the flows of FDI have been significantly lower in all EU27 countries and this continued up to 2010. In 2011 the FDI flows to EU27 began to increase again—except in Estonia, Romania, Czech, Cyprus, and the United Kingdom. In 2007–2013 EU funds moved from west to east. The operating budgetary balances¹⁰ of some countries (i.e., Germany and France show that their contributions significantly outweigh expenditures). On the other hand, the expenditures of, for example, Poland and Greece outweigh their contributions. Figure 2 shows the cumulated operating budgetary balances in 2007–2013.

The official EU website states that “Most EU funding finances programmes that further EU policies. A small amount is spent on contracts to buy in services and goods for EU institutions.” Funding is managed according to strict rules of transparency. But the responsibility to ensure tight control lies with national governments. We assume therefore that respective EU funds translate to implementation of specific EU policy.

4 Results and discussion

Preliminarily we tested each policy variable by adding it to the base model. In total, we tested 50 policy variables for the relationship with the FDI stock. We found that there is a relationship between EU Funds for Preservation and Management of Natural Resources, Agriculture markets, Market-related expenditure, and direct aids, Direct Aid, Animal and plant health, Media 2007 programmes and Europe for Citizens programmes and FDI stock.

In the next step, we tested for interactions among explanatory variables from the base model and each fund. Every interaction was tested with the Breusch-Pagan test to avoid heteroskedasticity. Next, we estimated random, fixed and two-ways models for each interaction and tested the first two with the Hausman test. We found significant interactions between EU funds for Preservation and Management of Natural Resources and unit labor cost as well as GDP per capita, however, it did not have a relevant impact on FDI stock—the coefficient was close to 0. The interaction between EU funds for agricultural markets and unit labor cost as well as GDP per capita have also been statistically significant but its impact on the FDI stock was also close to 0. Moreover, the interaction between EU funds for market-related expenditure and direct aids and GDP per capita as well as unit labor cost and government efficiency was statistically significant, however again not relevant when it comes to impact on the FDI stock. The interaction between Funds for Agricultural market Direct Aid and Government efficiency, unit labor cost and GDP per capita produced similar results—the interaction was statistically significant, but the coefficient was close to 0. We also find that the interaction between funds for animal and plant health and Government efficiency as well as unit labor and GDP per capita and between migration and government efficiency and unit labor cost (but not with GDP per capita). In both cases, the coefficient was again close to 0. Finally, there is an interaction between Media 2007 funds and GDP per capita, unit labor cost and government efficiency and interaction between total national contribution and government efficiency, unit labor cost and GDP per capita.

We also considered the possibility that EU funds could affect the FDI stock with a significant time lag. We found that the Lifelong Learning programme, Funds for Preservation and Management of Natural Resources, Agriculture markets, Market-related expenditure and direct aids, as well as the Direct Aid, Animal and plant health, Media 2007, and Europe for Citizens programme can influence FDI stock with a one-year delay. The total expenditure for all EU funds has affected the FDI stock with a one-year time lag as well. Finally, we also tested the rescaled policy variables by per capita terms. In the final step, we added groups of EU policy variables into the base model. The result of the modeling is briefly summarized in table 2.

10. The operating budgetary balance $OBB_i = (TAE_i - ADM_i) - TNC_i \cdot (EXP_{EU} - ADM_{EU}) / TNC_{EU}$, where TEA_i —expenditures, ADM_i —administrative expenditures, TNC_i —national contribution, i —denotes a member country, and EU —denotes the total for all member countries.

Tab. 2. Results of the estimation of regression models of ln(FDI) stock

Variable/model statistics	Model 1 (fixed effects)	Model 2 (random effects)	Model 3 (two-ways)
constant	–	8,842***	–
ln(gdp_percapita)	0,286	0,472**	0,667**
unit_labor_cost	0,006*	0,004	–0,008*
wgi_gef	0,271	0,285	0,139
man_nat	0,0001*	0,0001***	0,0001
media	0,037**	0,042***	0,029**
nature · gdp_percapita	0,0002	0,0002*	0,0001
migration · gdp_percapita	–	–	–
R^2	0,137	0,232	0,099
F statistic	4,124*** (df = 6; 156)	9,188*** (df = 6; 182)	2,757** (df = 6; 150)
Hausman test	0,3396		–
Variable/model statistics	Model 4 (fixed effects)	Model 5 (random effects)	Model 6 (two-ways)
constant	–	8,990***	–
ln(gdp_percapita)	0,351	0,531**	0,634**
unit_labor_cost	0,003	0,001	–0,008*
wgi_gef	0,215	0,238	0,153
man_nat	0,0001**	0,0002***	0,0001
media	0,029*	0,033**	0,027*
nature · gdp_percapita	–	–	–
migration · gdp_percapita	0,0001	0,0001*	–0,0001
R^2	0,135	0,225	0,091
F statistic	4,071*** (df = 6; 156)	8,821*** (df = 6; 182)	2,498** (df = 6; 150)
Hausman test	0,9088		–

* $p < 0,1$; ** $p < 0,05$; *** $p < 0,01$

Models 1, 2 and 3 show results for GDP per capita interaction with EU funds for the preservation of animal and plant health. Model 1 fixed effects, model 2 random effects, and model 3 two-ways. The F -test and Lagrange multiplier test on the pooled model for sets of variables used in model 1, 2 and 3 showed that $p < 0,05$, therefore, we assume significant effects, and the Breusch-Pagan test did not indicate heteroscedasticity. Model 4, 5 and 6 show results for GDP per capita interaction with solidarity and management of migration flows, model 4 fixed effects, model 5 random effects, and model 6 two-ways. In this case, the Breusch-Pagan test indicated that $p = 0,2223$ and the F -test and Lagrange multiplier test on the pooled model for sets of variables indicated significant effects. The Hausman test in the case of fixed and random models with EU funds for the preservation of animal and plant health interacting with GDP per capita indicated that the random model is consistent. The random model was also consistent for solidarity and management of migration flows interaction with GDP per capita.

The interpretation presented below is based primarily on the random effect models (i.e., models 2 and 5). Among our control variables only log GDP per capita turned out to be statistically significant. In contrast to previous analysis, the results did not indicate that there was a relationship between structural or cohesion funds and the stock of FDI. The results indicate instead that there is a positive relation between EU funds for preservation and management of natural resources (man_nat) and media 2007 programme (media), and the stock of FDI. Ceteris paribus, we might expect 1,01%–2,02% increase of FDI stock when funds for preservation and management of natural

increase by EUR 100 million. And we also might expect that FDI stock will increase 3,36%–4,29% if funds for media 2007 related programs increase by 1 million.

Our primary goal was to identify if there was a relation between specific EU funds, and we find there is no reason to believe that the relationship does not exist. Additionally, during this investigation, we also find two interactions between EU funds and GDP per capita influencing the stock of FDI. First, funds for the preservation of animal and plant health (nature), and second funds for solidarity and management of migration flows (migration). For countries with a higher level of output, we might expect that if funds for nature increase by additional EUR 100 million the stock of FDI increases by 2,02%. And if migration increases by an additional EUR 100 million we might expect 1,01% increase of the stock of FDI.¹¹

An OECD report by Mabey and McNally links environmental pollution with FDI activities.¹² In this light EU funds for preservation and management of natural resources are probably linked with institutional pressure directed towards MNCs, to internalize environmental costs of FDI. Environmental restrictions in the EU are relatively high in comparison to the rest of the world. Therefore, this might suggest that MNCs look for ways to finance environmentally friendly technologies and tap dedicated EU funds. The relationship between FDI and migration is associated with migrant networks and cross-border information flows (Javorcik et al. 2011). EU funds for solidarity and management of migration flows improve integration of external borders and promote information flows within the EU. Perhaps these funds somehow influence the patterns of migrant networks.

The review of the existing literature did not reveal any previous findings regarding EU funds for media or animal and plant health and FDI. Perhaps, in the case of the first, the relationship comes from some sort of reverse transfer of marketing practice—which would be in line with Filippov's observation of reversed knowledge transfer (Filippov 2014).

Conclusions

This research was intended to determine whether there is a significant positive relationship between EU funds and the stock of FDI. Empirical literature suggests that there is a connection between structural and cohesion funds and FDI, but former analyses were conducted for different programming periods. Until now there was no empirical research on 2007–2013 regarding this topic. Since every programming period reflects different strategic goals of the EU, it is not foregone that the relationship is positive or present at all. In fact, some of the authors suggested that we should not expect any, or we should expect a negative relationship between the stock of FDI and EU funds—particularly structural and cohesion funds.

The main results of this research can be summarized as follows. There is a positive relationship between the stock of FDI and selected EU funds. Not cohesion or structural funds as suggested by most of the analysis performed during EU enlargements, but funds for preservation and management of natural resources, media, the animal and plant health and the solidarity and management of migration flows—the last two in interaction with GDP per capita. We obtained this result by testing all funds from the EU revenue and expenditure statement. Our base model consisted of GDP per capita, unit labor cost, and institutional quality—measured by the World Bank Government efficiency indicator.

Our main contribution is two-fold. This is a first attempt to investigate the relationship of EU funds and FDI stock in the 2007–2013 programming period and the first attempt to analyze all EU funds from the EU revenue and expenditure statement. The limitations of this approach include foremost the size of the panel. Unfortunately, every programming period has a unique configuration of funds—every time they reflect different long-term EU strategies. Therefore, we could not combine time series from different programming periods. Future research should include the non-linear relationship between the stock of FDI and EU funds.

11. GDP per capita, preservation of animal and plant health, and solidarity and management of migration flows and stock of FDI are in EUR million.

12. See: Foreign Direct Investment and the Environment: from Pollution Havens to Sustainable Development. A WWF-UK Report by Nick Mabey and Richard McNally, August 1999, [@:] <http://www.oecd.org/investment/mne/2089912.pdf>.

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