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An Impact Evaluation of Public Financial Aid on Economic Development at Macroeconomic and Firm-Level: The Case of Transition Economies

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Overview

During the last three decades, transition economies in Eastern Europe and Central Asia have experienced important structural, institutional, and political reforms under the umbrella of shifting from state socialism to market economies. Although economic progress is polarized within this region, all countries share a common history and characteristics such as underdeveloped capital markets, institutional setups, and higher risks. National and regional public authorities, as well as international development agencies, have granted a significant amount of financial assistance for the improvement of institutional development, business environment, and economic growth in these transition economies. This Ph.D. thesis is dedicated to the study of the role of the various public financial aid instruments for economic growth in the Eastern European and Central Asian countries at macroeconomic and microeconomic levels.

We start with an extended literature survey of previous studies evaluating the impact of the European Structural Investment Funds (ESIFs) and Foreign Aid focusing on the region of our interest. Looking at the literature through the four conventional dimensions: empirical framework, outcomes of interest considered, geographical span covered and the determinants of the effectiveness of the funds helped to identify potential areas for further research in the field. In the second chapter, we explore the impact of official development assistance (ODA) and European Structural and Investment Funds on the GDP per capita and its components of member states that joined the EU recently and other neighboring countries. Developing upon the methodology used in Coppola et al. (2018), we undertake an evaluation of the funds' effects based on a model of their allocation rules, thus dealing with the selection bias inherent in policy evaluation. We consider country-level data for the 1995-2018 period and compare the effect of ODA (before accession) with that of ESIFs (after accession). Estimating a multi-input multi-output distance function, we also separate the impact on GDP per employee (labor productivity) from that on the employment rate.

Our estimates show that gross fixed investment and ESIFs have a significant positive impact on GDP per capita while the impact of ODA is significant only in countries that have not joined the EU. Among ESIFs the Cohesion Fund has the more consistently positive and significant effect, while the ERDF is basically never significant. The EAFRD has a positive

and significant effect only for some country groups, while the ESF negatively (but weakly) enters the GDP per capita equation. We did not find evidence of strong differences in the effect of policy funds upon GDP per employee and employment rate.

The third chapter evaluates the impact of public subsidies on innovation and performance indicators of 2729 firms across 29 transition economies in Eastern Europe and Central Asia during 2009 and 2013. We add to the existing literature by extending the little empirical evidence available for the group of transition economies and bringing panel techniques to these data, also applying a difference-in-differences framework. We mainly rely on entropy-based balancing techniques and adopt a selection-on-observables two-stage analysis as a robustness check. Our main conclusion is that public subsidies have a positive impact on innovation and employment growth, but no impact was observed on productivity and sales growth. The evidence also suggests that larger and privatized firms are subsidized more often but are less efficient in terms of performance and innovation. Furthermore, the impact of subsidies on innovation is stronger for non-EU countries.

Chapter 1: Literature review on the effectiveness of The European Structural Funds and Foreign Aid

1.1 Introduction

The European Structural and Investment Funds (ESIFs) have served as the main instruments of correcting regional imbalances since 1975. The assumption behind the ESIFs is that market forces are not enough for the reduction of regional disparities in the European Union (EU). The European Parliament and the Council of the EU are responsible for the organization, setting priorities and goals of the ESIFs. All member states are eligible for the ESIFs, but the majority of the funding flows to less developed regions. The ESIFs consist of the five funds: the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF) for EU's Cohesion policy; the European Agricultural Fund for Rural Development (EAFRD) which serve to implement the Common Agricultural Policy (CAP), and the European Maritime and Fisheries Fund (EMFF) under the common fisheries policy.

In the beginning, the funds were concentrated in lagging regions and had a minor macroeconomic effect. Annual funds could not exceed two percent of annual GDP (Fuente and Vives, 1995). Currently, the ESIFs play a significant role in fiscal and political terms and comprise more than 30 percent of the EU budget. For example, in Baltic states, the ESIFs comprise around ten percent of GDP. The funds became an indispensable part of the integration and development process in the EU. The enlargement of the EU to the new member states (NMSs) with lower income led to the growth of the ESIFs to decrease income disparity in the community (Donaghy and Dall'Erba, 2003)

In 1998, the EU introduced the reform of following four principles in the implementation of the ESIFs: concentration – the funding must cover few but significant target areas; programming – or planning the ESIFs for around 6–7-year periods; partnership – regional, national, and local levels of governance must participate in the management of the funds; additionality – the ESIFs cannot be a substitute, but only complementary to national and

local public investments. These principles may sometimes complicate the effectiveness of the funds by creating additional rigidity (Coppola and Destefanis, 2015).

All EU regions have access to the ESIF funds depending on their Objective Status:

Objective 1 (Convergence objective) is for the regions with GDP per capita below 75 percent of the EU average or NUTS 2 regions (one-fourth of all the EU regions). NUTS21 is where the level of inequality is unacceptable and requires a convergence policy. It prioritizes investments in human and physical capital, innovation, knowledge society, environment, and administrative efficiency to facilitate economic development. The budget allocated to this objective in 2007-2013 comprised EUR 283.3 billion or 82 percent of the funds (Dziuba, 2016). A large portion of existing empirical analysis focuses on Objective – 1 (O1) regions due to data availability: the reforms started in 1989 so there is comparatively plenty of data (Boldrin and Canova, 2001)

Objective 2 (Regional Competitiveness and Employment) covers all the regions except for the ones in O1 and invests in innovation, entrepreneurship, and environmental protection to grow regional economic competitiveness. The O2 is funded by the ERDF and the ESF. Since the 2007-2013 program, all regions except for the O1 became eligible for O2.

Objective 3 (European Territorial Cooperation) is financed by the ERDF. As a part of the Cohesion Policy, the third goal aims at strengthening the economic and social cohesion of the Union. The member states and regions are stimulated to cooperate and share common projects so there is a spillover effect and stimulation of regional convergence.

1.2 Literature review on the effectiveness of the Structural Funds in the European Union

A large amount of financial resources has been dedicated to the regional development of the EU member states. But the persistence of economic disparities, particularly in terms of purchasing power, among the EU regions, has served as a motivation for policy initiatives and, accordingly, research assessing those policies. There is vast literature on the impact evaluation

1 The main principles of the NUTS classification of the EU regions are the population size and administrative qualities of the regions.

of the EU Regional Policies with the tools of the EU ESIFs on regional development. However, there is no common consensus about the effectiveness of the funds.

In 1991, Barro and Sala-i-Martin have popularized the concept of "Beta convergence" which measured the ability of regions with lower initial low income per capita and productivity to catch up with more developed peers. The following is the regression equation that Barro and Sala-i-Martin used to estimate the convergence process across European regions:

$$\Delta log\ y_t^i = \alpha_\iota + \beta \log\left(\gamma_{t-\tau} + \varepsilon^\iota\right) \tag{1.1}$$

Where y – per capita income or value-added, productivity, i-country, t-period of time, α – a number of individual characteristics, β- rate of convergence, ε^ι-error term.

Having analyzed the dynamics of regional convergence in the US and the EU during the period from 1950 to 1985, the authors concluded that the regions tend to converge at a rate of (comparatively slow) two percent. However, the authors also confirmed pessimistic views on the ability of state interventions to speed up the process of regional convergence as a result of the empirical observations in the EU and the US (Barro and Sala-I-Martin, 1992). A number of researchers have employed the Barro convergence approach to study the dynamics of economic convergence (Bank et al., 2005; Cappelen et al., 2003). Canaleta et al. (2002) stated that the model may be too simplistic when assessing the causal effects on growth.

An influential paper was written by Boldrin and Canova (2001). They compared regional inequality levels in the US and EU and concluded that the inequality in Europe was growing. They demonstrated significant economic disparities within the EU regions, even among the ones which were geographically close to each other. Also applying B-convergence regression with various specifications on 185 NUTS2 data during 1980-1996, the authors assess whether the EU funding for convergence was used appropriately and whether the enlargement of the subsidies was justified. They considered that common fiscal and monetary policy, free mobility of factors could induce convergence without the additional funding. The authors intended to create the ground for a large number of transfers. The main question they raised was if poor regions would remain poor without the transfers. The authors concluded that the convergence policy simply served as an income redistributive tool for lagging regions. They recommend that the subsidies should be directed to the agglomeration process to foster economic growth. The work of Fratesi and Perucca (2014) has confirmed the absence of the growth effect of the funds, but with the clarification that the existence of territorial endowments both in terms of private and public capital has a chance to gain more from the funding compared

to those without endowments. Another issue that Fratesi mentions in his literature survey is the idea that the Cohesion policy is a long-term process. This factor was ignored due to lack of data availability, as a result, the impact was measured only within around 10-15 years. (Fratesi, 2016)

There has been a number of empirical papers which demonstrated positive impact instead (Bank et al., 2005, 2010; Crescenzi and Giua, 2016; Esposti and Bussoletti, 2008a; Fuente and Vives, 1995; Maynou et al., 2016; Puigcerver-Penalver, 2007) as well as mixed-effects (Guillain and Le Gallo, 2010; Pellegrini et al., 2013; Rodríguez-Pose and Novak, 2013), conditional on policy types and characteristics of recipient regions such as institutions (Becker et al., 2012; Rodríguez-Pose and Garcilazo, 2015), territorial endowments (Dall'Erba et al., 2008; Fratesi and Perucca, 2014; Sotiriou and Tsiapa, 2015) or competitive advantages of the region (Midelfart-Knarvik et al., 2001) industrial structure (Cappelen et al., 2003; Gagliardi and Percoco, 2017), settlement structure (Gagliardi and Percoco, 2017), human capital (Becker et al., 2013), alignment with socio-economic structure (Crescenzi, 2009), type of expenditure (Rodríguez-Pose and Fratesi, 2004) and others.

Cappelen et al. (2003) argue that the dominance of agriculture in economic structure and low R&D negatively affect the efficiency of the ESIFs. Rodríguez-Pose and Fratesi (2004) highlighted that the investment in human capital must be prioritized first instead of infrastructure building, business support, or agriculture. According to Canaleta et al. (2002) the major driving force behind convergence, at least for the less developed regions, is labor productivity. Ederveen et al. (2006) have mentioned the importance of institutional building in the effectiveness of the ESIFs. Beugelsdijk and Eijffinger (2005) and Coppola et al. (2018) in contrast, conclude that institutions and quality of government have no relevance for the effectiveness of the EU funds.

Another group of researchers has studied the characteristics of the regional policies and their cause on effective use. Becker et al. (2012) argued that the growing intensity of transfers may negatively affect the growth effects and the maximum level of intensity must be no more than 1.3 percent of GDP. De Dominicis (2014) concluded that a higher concentration of funds in a limited number of regions may enhance growth in the early stages of development. According to Percoco (2017), the effectiveness of the policies increases when they are tailored to the local economic structure of the receiving region. Rodríguez-Pose and Garcilazo (2015) clarified that the importance of the regional institutional quality grows only when the level of

cohesion expenditure exceeds 120 EUR per person and year. Finally, Tomova et al. (2013) highlighted the importance of concurrent sound fiscal and macroeconomic policies.

1.2.1 The review of the methodological approaches

Recently, there have been two broad approaches to the evaluation of regional policies: structural and experimental (Breidenbach et al., 2016). The structural approach applies econometric analysis in accordance with existing growth and convergence theories. Most of the papers employ neoclassical growth model (Aiello and Pupo, 2012; Mohl and Hagen, 2010; Rodríguez-Pose and Fratesi, 2004; Rodríguez-Pose and Novak, 2013), Barro convergence (Boldrin and Canova, 2001; Canaleta et al., 2002; Fratesi and Perucca, 2014), augmented conditional convergence model (Esposti and Bussoletti, 2008b; Gagliardi and Percoco, 2017; Le Gallo et al., 2011; Maynou et al., 2016; Percoco, 2017), Cobb-Douglas production function (Puigcerver-Penalver, 2007). The paper of Midelfart-Knarvik and Overman (2002) used the economic geography approach: an empirical model of industrial reallocation determinants but interestingly was not yet studied more.

The structural approach was used for macroeconomic analyses while quasi-experimental tools such as generalized propensity score matching (PSM) or regression discontinuity design (RDD) were employed both for macroeconomic and microeconomic analyses as well as labor economics (Becker et al., 2010; Mitze et al., 2015; Mohl and Hagen, 2010; Pellegrini et al., 2013). The experimental approach allows for self-selection to treatment and endogeneity of the policy variable.

A comparatively modern tool is employing RDD at the spatial level, which is comparing small spatial units at the borders of treated and untreated regions (Giua, 2017). Specifically, there are econometric techniques such as spatial lag of the dependent variable, spatial lag of explanatory variables, spatial Durbin models to detect inter-regional spillover effects, and the technique of instrumental variables (IV) to solve the endogeneity problem. According to Fratesi (2015), the best of spatial matrices are done by Basile et al.(2012), Thissen et al. (2013) but they were not applied to Cohesion policies yet. Artelaris (2015), Bivand and Brunstad (2005), Sassi (2010), Bourdin (2019) studied the effect of the EU funds applying spatial econometric techniques.

1.2.2 The geographical span

Most of the existing literature assesses the impact of the ESIFs on EU-15 member states (Basile et al., 2012; Ederveen et al., 2006; Maynou et al., 2016; Midelfart-Knarvik and

Overman, 2002) and at the level of NUTS2 regions (Becker et al., 2012; Beugelsdijk and Eijffinger, 2005; Boldrin and Canova, 2001; Breidenbach et al., 2016; Cappelen et al., 2003; Esposti and Bussoletti, 2008b; Le Gallo et al., 2011; LeSage and Fischer, 2008; Pellegrini et al., 2013; Puigcerver-Penalver, 2007; Ramajo et al., 2008; Rodríguez-Pose and Fratesi, 2004; Rodríguez-Pose and Garcilazo, 2015; Rodríguez-Pose and Novak, 2013). According to the literature survey of Fratesi (2015), NUTS 3 regions are heterogeneous in terms of regional endowment, whereas NUTS2 regions may raise difficulties because of the differences in population size.

There are fewer single country analyses like Spain (Fuente and Vives, 1995), Finland (Vehkasalo, 2018), and Italy (Aiello and Pupo, 2012; Coppola and Destefanis, 2015 and others) as well as works dedicated to NUTS3 regions (Crescenzi and Giua, 2016; Gagliardi and Percoco, 2017) and almost no studies which develop the cross-country analysis in member states. Moreover, there is a lack of research when it comes to new member states which joined the EU in 2004 (Pieńkowski, 2015).

1.2.3 The outcome of interest

Since most of the reviewed studies analyze growth as a part of neoclassical model, it is common in literature that GDP growth per capita (or per labour unit) is used as a dependent variable (Becker et al., 2012; Beugelsdijk and Eijffinger, 2005; Boldrin and Canova, 2001; Breidenbach et al., 2016; Cappelen et al., 2003; Coppola et al., 2018; Dall'erba and Le Gallo, 2008; De Dominicis, 2014; Ederveen et al., 2006; Esposti and Bussoletti, 2008b; Fratesi and Perucca, 2014; Le Gallo et al., 2011; Maynou et al., 2016; Mohl and Hagen, 2010; Pellegrini et al., 2013; Percoco, 2017; Puigcerver-Penalver, 2007; Ramajo et al., 2008; Rodríguez-Pose and Fratesi, 2004; Rodríguez-Pose and Garcilazo, 2015; Rodríguez-Pose and Novak, 2013). In the framework of Barro convergence, GDP per capita is explained by the initial GDP level, a variable explaining the regional policy (amount of transfers or a dummy variable, etc.), and regional endowments.

Alternative dependent variables are normally related to job creation and labor productivity (Coppola and Destefanis, 2015; Crescenzi and Giua, 2016; Fuente and Vives, 1995; Giua, 2017), industrial location patterns (Midelfart-Knarvik and Overman, 2002), and productivity (Esposti and Bussoletti, 2008b).

This survey demonstrates the lack of papers on how EU funding shapes industrial location which was done by Midelfart-Narvik and Overman (2002). Briefly, the authors

intended to define the role of the EU and state aid in changes in the share of industry i that is located in country j. They used the country's share in total EU manufacturing as the dependent variable. The changes in industrial location were examined in between two periods: 1990-1993 and 1994-1997 as a function of the average aid flows in 1994-1996. The authors assumed that the ESIF is a tool to increase the impact of the EU interventions compared to the state-level interventions for the lagging economies and those under structural changes.

The assumption behind EU funding is that national policies are unable to grasp the full potential of the integration and EU aid is necessary to achieve it. There are three schemes of the EU aid: horizontal – aid to certain types of activity independent of sector and location, sectoral and regional – infrastructure, training, and unemployment initiatives (Midelfart-Knarvik and Overman, 2002). The authors assume that the interaction of the two major forces: agglomeration (access to customers and access to suppliers) and dispersion define the location of industries. The dispersion forces show the comparative advantage of every region. There is further potential for joint studies of the EU and national policy, but not only direct aid on manufacturing. According to Lane (reviewer of the paper), public spending on education, research, and infrastructure, procurement policies could be studied further. The followings are the econometric specifications used by Midelfart-Narvik and Overman (2002)

Specification No.1: To account for changing regional endowments and policy, the authors used the specification as follows:

$$\text{Share of a country in an industry} = f(\text{Size of the country, Country characteristics, Industry characteristics}) \quad (1.2)$$

Specification No.2 is used to account for the role of economic integration and policy:

$$\text{Change in share of a country in an industry} = f(\text{Size of the country, Country characteristics, Industry characteristics, Flow of aid}) \quad (1.3)$$

The results of the study demonstrated that an increase in medium-skilled labor attracts relevant industries for this labor. Aid has a positive impact on production structure, EU aid recipients attracted more R&D-intensive activities. The change of endowments did not lead to changes in industrial structure. The two significant effects are that if the country has increased its centrality, then aid leads to a decrease in firms responsible for industrial output. Secondly, the increase in the number of high-skilled workers was followed by an increase in R&D-intensive industries at the expense of medium-skilled industries. One focal conclusion is that

the authors could not find positive effects of horizontal and sectoral state aid on production shares. EU aid had a significant effect on industrial location. Importantly, the authors highlight that the community aid is distortive in the sense that it attracts R&D-intensive industries to the regions without the right endowments of skilled workers both at the national and regional levels. Generally, the authors confirm the positive effect of the EU policy. Here the EU statement that state aid needs to be reduced in order to prevent distortions and may inadvertently become a counter activity in fostering cohesion was not confirmed. In this context, the results demonstrate that state aid was not followed by the attraction of desired high-value end industries. Therefore, the authors recommend the development of coordination among community aid and state aid.

Previous studies such as Amiti (1999) and Brülhart (2001) have shown that the EU integration has led to an increase in specialization in NMSs. According to the study, labor-intensive industries have agglomerated while high technology industries became less concentrated in the EU. Because the authors studied in two dimensions: national and regional, while at the national level the EU integration is inducing industrial location in relevance with comparative advantage. The regional level, instead, demonstrates that the regional inequality within states is increasing while regional industrial structures are described by lack of specialization.

Fratesi (2015), in his survey, mentioned that the outcome of interest could be improved by using some indicator that measures not only economic performance but also social advancements in the studied regions. Only Tomova et al. (2013) used the indicator of socioeconomic development (SEDI) as the dependent variable and measured its change against the initial index. Vehkasalo (2018) expanded the dependent variable following the objectives of the funding to indicators such as "share of inhabitants with tertiary education" and "median disposable income per capita".

Coppola and Destefanis (2015) assessed the effects on several other indicators besides regional GDP: labor productivity change, employment rate, and TFP, capital stock per unit. This is also one of the very few studies which consider the effect of the ESIFs on labor productivity changes across four different sectors in Italy. The authors employed a non-parametric FDH-VP to calculate the Malmquist productivity index[2] to assess the effect of the funds on factor accumulation and total productivity changes. For this, the authors calculated

2 The Malmquist index measures variations in TFP.

the Malmquist productivity index for the three programming periods during 1989-2006 and across four sectors (agriculture, manufacturing, construction, and services) in twenty regions of Italy.

The authors assume the main sources of agglomeration process and growing disparities is increasing returns to scale and assessed it by computing scale efficiency across regions and sectors. Indeed, they found out that there is no such a strong scale efficiency[3] (except for energy and manufacturing sectors) and therefore there were no phenomena of divergence. The second part of the paper covers the assessment of the impact of the funding on these indicators and employment using fixed effects regression analysis. To be more specific, the authors studied the impact of the ESIFs on the components of output per labor unit such as technical efficiency, technical change, scale efficiency, stock of capital per labor unit.

$$\Delta\chi_{it} = \alpha_i + \alpha_1 SOUTH + \alpha_2 PERIOD_2 + \alpha_3 PERIOD_3 + \alpha_4 PERIOD_2 * SOUTH + \alpha_5 PERIOD_3 * SOUTH + \alpha_6 \chi_{it-1} + \alpha_{7J} FUNDS_{jit} + \alpha_8 z_{it} \quad (1.4)$$

The identification is usual *i* – for regions, *t* – for periods, $\Delta\chi_{it}$- is a variable of interest which are several in the paper (components of labor productivity change: employment rate, variations in TFP using a Tornqvist index, regional GDP, capital stock per labor unit, and regional GDP per capita). PERIOD is a dummy for the second and the third periods (1994-1999) and (2000-2006) consequently. SOUTH is a dummy variable for the "Mezzogiorno" regions to account for systematic differences among regions. χ_{it-1} allows for dynamic structure and to mitigate the issues of omitted variables. $FUNDS_{jit}$ stands for the different types of the ESIFs andz_{it} stands for capital account expenditures. According to the results, the funds had a weak but significant impact on TFP, but not on employment and capital accumulation. The ESF had the strongest impact among other funds, specifically, on regional GDP and GDP per capita. The conclusions are in line with the suggestions of Garcia-Solanes and Maria-Dolores (2002), and Aiello and Pupo (2007).

Besides the ESIFs, other monetary transfers such as foreign aid, national funding also aims at reducing the differences in economic performance among EU member states. But there are fewer studies assessing the effectiveness of capital flows through ESIFs and other concurrent flows from the national budget and private sector. In their literature review, Coppola et.al (2018), explains that the existing research on the effectiveness of the Structural Funds

3 The SE measures the percentage increase in output due to a unit percentage increase in all inputs.

focused far more on the impact of the funds rather than on the factors of their distribution. Using Solow's augmented neoclassical growth model and considering the allocation mechanism of the funds, studied how the ESIFs along with national funds for the regional industrial policy influenced productivity and factor accumulation in 20 Italian administrative regions for the 1994 - 2013 period (Coppola et al., 2018). The specification is as the following:

$$\Delta\gamma_{it} = -\alpha_1\gamma_{it-1} + \alpha_2 gfi_{it} + \alpha_3\Delta pop_{it} + \alpha_{4j}SF_{jit} + \alpha_{5j}NAT_{jit} + \alpha_{8j}W_{it-1} + \alpha_i + \alpha_t + \varepsilon_{it} \quad (1.5)$$

where, $\Delta\gamma_{it}$ is a (log) variation of GDP per capita, *i*- regions, *t* – years,γ_{it-1}- allows for the dynamic structure, $\alpha_2 gfi_{it}$is a (log) ratio of gross fixed investment/ GDP, Δpop_{it}- the (log) variation of the population respectively, SF_{jit}- the European structural funds or foreign aid in case of non-EU states (whose types are indexed by j), NAT_{jit}- an array of national funds related to regional policies (also indexed by j) log-ratios /GDP (current account subsidies to both firms and households, and capital account expenditures split among subsidies and investment expenditures). W_{it-1}- variables presiding over the regional allocation of the funds. $\alpha_i$and α_t are region and year fixed effects respectively andε_{it}- independent and identically distributed error term. The authors conclude that in terms of allocation mechanism the ESIFs are negatively correlated with national payments. The effects of the ESIFs were significant and positive for GDP per capita, while national funds were not found to be significant.

The recent work by Bachtrögler et al. (2019) studied firms supported by EU Cohesion policy. They assume that the effect of the funds and private investments on firms is fostered by the territorial characteristics of the region. Indeed, there are fewer studies on the micro-effects of the Cohesion fund and putting the focus on the interaction between public and private capital flows. Although there are existing studies about how firms' performance depends on the regional environment characteristics they are located in (Ricotta, 2016). But such work hasn't been done in the context of the ESIFs. Therefore, applying the Total Factor Productivity (TFP) technique, the authors estimate the productivity of EU firms in different sectors (Gal, 2013). The outcome variables are changes in value-added, change in employment, and value-added per employee. In the second part, the authors compare differences in productivity of treated and untreated firms identifying them by territorial belongings. As in existing literature, the authors condition the productivity on material and institutional assets. The results reveal the importance of territorial characteristics in improving the treatment effect and that the future strategy of the Cohesion policy is recommended to take into account such factors in its design.

1.3 The effectiveness of EU Structural Funding in the Central and Eastern European New Member States

Although there is an abundance of literature assessing the effectiveness of the ESIFs, few of them are dedicated to systematically studying and comparing the impact of the European Regional Policies in the NMSs. This observation has been validated in the literature surveys of Pieńkowski (2015) and Bourdin (2019). Moreover, the recent-meta analysis by Dall'Erba and Fang (2017) which considered purely econometric evaluation studies of the EU funds did not have works based on the NMSs of the EU.

The CEE region states have become members of the EU since 2004 and the earliest assessments start since 2008 with obvious limitations. The methodologies as semi-structured interviews (Bachtler and McMaster, 2008; Churski and Borowczak, 2010; Gasiunaite and Juknyte-Petreikiene, 2016) were applied to assess the impact of the ESIFs. There are even fewer works that applied quantitative evaluation approaches to address the causal effects on regional growth. Kancs (2005) have studied the socio-economic and spatial impacts of transport investments and other transport policies in the Latvian region until 2025. He applied a multiregional economic geography model (GEM) with households in each region representing final demand and firms representing the production sector. The outcomes of interest are GDP variations and the value of increases in jobs explained by EU investment in infrastructure. Using the Industrial Database in Eastern Europe, the author concludes that the investments in regional accessibility had a minor effect on inducing economic activity depending on location. However, rail projects seem to be more effective in terms of promoting regional economic activity than road projects. Generally, the policy advice of the author is that rapid upgrading and extending of the rail and road infrastructure in Eastern Europe would contribute to the economic and social integration of the accession countries after the enlargement of the EU.

Dabrowski (2008) studied the effect of the ESIF on administrative institutions and the reinforcement of civil society in Poland. Poland is one of the largest recipients of European funding due to the large population and because all of its regions are classified as O1. The author demonstrates an ongoing debate on the institutional adaptation of the NMSs to new EU

rules. Paraskevopoulos and Leonardi (2004) earlier highlighted the risk of only "formal" compliance to the EU rules which may prevent them from the adaptation. Dabrowski concluded that the development of regional networks is more associated with motives of local stakeholders to acquire the EU funding and there is no evidence of positive changes in civil society. He implied that possibly the partnership principle of the EU funds in the CEE NMSs may not be of use to involve non-state actors' participation. As a focus of the study, Dabrowski took a sample of Lower Silesia, where the number of NGOs is higher compared to other regions and there are comparatively better institutions. However, this region was of particular interest because it absorbed less amount of funding compared to other regions despite inhibiting better institutions. He conducted semi-structured interviews with the experts of the institutions responsible for the ESIFs in the region. The author highlights still the limited, restricted ability of regional bodies to take part in the formation and implementation of the regional policies such as financial management of the funds. The result of the interview revealed a lack of central government's trust in regional actors. Most importantly, there was no significant ESIFs effect on the reinforcement of civil society. He concludes that there might be a need for more tailored approaches than the "one size fits all" partnership principle to strengthen democracy at a local level in the CEE states.

In 2009, Snieska and Simkunaite have done a statistical analysis of the EU Funding for the infrastructure of transport, communications, and sanitation (Snieska and Simkunaite, 2009). However, the analysis was weak due to a lack of data in regional peculiarities and also due to the lack of unique methodology at hand. Dumciuviene and Stundziene (2015) studied the effect of ESIFs on economic development in Lithuania between 2003-2014 (GDP per capita, R&D expenditure as percentage of GDP, average earnings, number of companies, turnover of companies, labor productivity, trade, poverty, emigration, population, and growth compared with other member states). They find a significant direct relationship between the funding and the FDI per inhabitant, but not other indicators. Having stated that the funding is undoubtedly necessary to promote economic growth, the authors question the current maximum efficiency of the use of the EU funds.

There are also several sectoral studies assessing the effect of the ESIFs in the Baltic states. For example, Bobinaite and Tarvydas (2014) use the extended model of energy generation "Levelized cost of energy" (LCOE) to assess the effect of renewable energy support policy (RES) financial channels and instruments on energy cost. The analysis of financing

channels and instruments in Lithuania revealed that feed-in tariff is the most important instrument used to facilitate investment in the renewable energy sector.

There is an emerging debate among researchers on the fact that the integration of CEE member states may have not brought significant competitive advantages to these economies. According to the analysis and literature survey of Glinkina et al. (2014), the NMSs of the EU in CEE are indeed gaining economically from the ESIFs as a number of empirical studies tracked the direct relationship between the EU funds and economic growth, especially in less developed countries and regions. They highlight apparent drawbacks of these studies as financing may not be the only factor of growth. Community aid led to the growth of employment, and, accordingly, demand in NMSs. However, the authors raise the question of to what extent the funding will stimulate supply growth. The authors also mentioned that the CEE economies weakened after integration. The main reasons for that were lack of development in R&D and almost full absence of diffusion of technology attracted as a part of FDI. All of these factors, according to Glinkina et al (2014) led the economy to divide into two sectors: foreign – a more effective and export-oriented and national – lagging in terms of productivity and functioning mostly inside the countries. The analysis indicated the presence of divergence processes at the regional level in Lithuania, Bulgaria, Hungary, the Czech Republic, and Slovakia. In other CEE countries, the beta-convergence of income at the regional level was not statistically significant. And finally, according to the study the divergence within the two groups of EU member states, the EU-15 and the EU-11 was increasing.

The recent work of Bourdin (2019) provided additional evidence for the lack of studies on impact evaluation of the ESIF focusing on the CEE. The author highlighted the multipolar growth within the region and therefore the need for a localized approach in understanding the differences across these countries. Therefore, using a geographically weighted regression (GWR) at the NUTS 3 level, the author studied the role of Cohesion policy in regional growth in the CEE region. The research results revealed positive but differentiated spatial variations of the influence of the European funds on regional economic growth. Specifically, the core regions and the ones located closer to the EU-15 underwent a significant and higher positive influence from the Cohesion policy compared to the periphery regions. Specifically, the author finds out that all the regions of the Czech Republic, Western regions of Slovakia, Hungary, and Slovenia benefitted the most from the EU Funds. However, the author explains that these regions are also endowed with favorable conditions for growth such as better institutions, a more favorable economic environment, human capital as well as the capacity to co-finance a

larger amount of the ESIFs in tune with the additionality principle as opposed to the lagging regions. In conclusion, the work validated the concept that initial conditions of the recipient regions are significant in determining the effectiveness of the Cohesion Policy and that the lagging regions within the NMSs did not benefit as was expected.

1.4 Literature review on the effectiveness Foreign Aid

Empirical studies on foreign aid[4] effectiveness have been done since the 1970s. According to Burnside and Dollar (2000), these works had problems with the correlation of error terms. Later, the study by Boone (1996) applied instrumental variables (IV) tools and concluded that aid had no significant impact on growth. However, the endogeneity problem was not solved by that time.

Previous research on aid effectiveness has shown that the impact depends on the sectoral distribution, ability to absorb aid, and domestic institutions (Arazmuradov, 2015). But some other authors mention the volatility of aid and co-movement of aid with GDP as causes of the difference in outcomes. A large strand of literature like Cooper (1999) and Burnside and Dollar (2000) stresses the role of recipient states' characteristics such as policies and institutions. There were pessimistic conclusions about the effectiveness of foreign aid as well (Easterly et al., 2005; Rajan and Subramanian, 2011). Easterly (2003) mentioned that the aid effectiveness papers before Burnside and Dollar's (2000) had many constraints in data availability, accompanied by specification issues. Therefore, we consider mostly the empirical works after Burnside and Dollar (2000) and Collier and Dollar (2002) which defined the battleground for aid-growth nexus debates.

Burnside and Dollar (2000) studied if the quality of concurrent macroeconomic policies defined the aid effectiveness in terms of inducing the growth of per capita GDP. For that, they used 275 growth–aid–policy episodes (56 countries) during six time periods of four years. They employed a modified neoclassical growth framework and estimated whether the effect of aid is conditional on economic policies and if agencies allocated more aid to countries with good economic policies. According to the neoclassical growth model, a gift of aid is expected to

4 In order to be defined as ODA, at least 25 per cent of the funding must be a grant (OECD). The OECD definition indicates that, to qualify as a development assistance (ODA), the funding must have "a grant element of at least 25 percent."

have a positive effect on growth. So they took the level of net receipts of aid relative[5] to GDP and the level of aid squared as explanatory variables. In the equation, aid interacts with policies as the latter is assumed to influence the effect of aid on growth. The authors also consider other exogenous factors which could potentially affect the growth and aid flow as well as regional and time period dummies. As proxies for macroeconomic policies, the authors used the trade openness index, inflation for monetary policy, budget surplus, and government consumption (GC) as indicators for fiscal policies relative to GDP. Later, the authors dropped GC because it correlated with a budget surplus. Security of property rights and efficiency of the government bureaucracy was taken as proxies for institutional quality. Moreover, there is a time-invariant variable for the ethnolinguistic fractionalization index. The authors also control for "assassinations" variable and development level of financial markets representing it with M2 over GDP as well as for regional dummies and share of arms imports in total imports.

The empirical approach of Burnside and Dollar (2000) approach is as follows:

$$g_{it} = \gamma_{it}\beta_{\gamma} + \alpha_{it}\beta_{\alpha} + \rho'_{it}\beta_{p} + \alpha_{it}p_{it}\beta_{1} + z'_{it}\beta_{z} + g_{t} + \varepsilon_{git} \quad (1.6)$$

i - stands for a country, t-time period, g_{it} - real GDP growth per capita: instrumented by oil exports/GDP, γ_{it}- logarithm of initial per capita GDP, α_{it}- aid receipt relative to GDP, ρ'_{it}- vector of policies that affects growth: the policy index was defined as the weighted sum of budget surplus, the inflation rate, and an openness index, z'_{it}– vector of other exogenous variables which affect growth, g_t – fixed time effectsε_{git}–mean zero scalars

The results show that the aid with stronger donor interests is correlated with GC. On average, aid had a weak impact on growth, but a higher positive impact in countries with good policy environments. Aid was attracted to countries regardless of policy qualities, while multilateral aid is attracted to better policy places, bilateral aid is strongly correlated with GC, the policies in poor countries were improving and the amount of aid was diminishing. Also, the results demonstrated that aid with higher donor interests (specifically bilateral aid) causes higher GC while multilateral aid is more present in countries with good policies, implying that multilateral aid could be more effective (Burnside and Dollar, 2000). This was a strong

5 The aid variable is proxied by "Effective Development Assistance" (EDA) constructed by Chang et al. (1998) which is basically the sum of grants and the grant equivalents of official loans.

statement, concluding that aid does promote growth and that it is important to send it selectively to the countries with sound macroeconomic policies (Easterly, 2003).

The work has raised further debates not only among scholars (Easterly et al., 2005; Guillaumont and Chauvet, 2001), but also among international aid agencies. The results were used as evidence for conditioning aid on policies in the foreign aid agenda. This spurred more studies testing the credibility of the results, especially as there were developing countries in need of aid and risking losing it after conditioning upon policies.

Dalgaard and Hansen (2001) highlighted the lack of theoretical contributions to aid-growth nexus and revisited the topic of policy conditionality for aid provision. They criticized Burnside and Dollar (2000) specifying that the macroeconomic policy indicators used were not comprehensive enough and that the sample of countries was too small. So instead, they duplicated the paper with more attention to details and econometric analysis steps. They revisited the foundations for the policy selectivity recommendations both theoretically and empirically. Theoretically, they developed a simple neoclassical growth model similar to the one of Ramsey-Cass-Koopmans framework in which firms face a risk of having part of the production destroyed because of social unrest. The authors concluded that aid has a positive effect on growth regardless of the quality of the policy environments, that there are diminishing returns to aid and the aid-growth relation is non-linear. The authors argue that the importance of policy conditionality is "data dependent" and it is premature to apply this conditionality in aid distribution. Therefore, these various results using the same data motivate further research in this nexus. The work of Hansen and Tarp (2001) have similar results in finding that the marginal impact of aid on productivity diminishes as the size of the inflow rises.

Again, as a reaction to BD, Guillaumont and Chauvet (2001) test whether the policy is the only factor that affects the aid effectiveness. Their hypothesis suggested that more than the policy environment, the external environment elements such as trade trends and climatic shocks have a significant effect on aid productivity. Therefore, in case there is a situation of aid conditionality on economic performance, the authors highlight the importance of adjusting for the total effect of "exogenous" factors on growth rate. The analysis showed that contrary to the results of BD, aid effectiveness is not defined by the quality of the policy, although some macro-policy variables are factors of growth. Instead, the aid effect depends on the external environment. The worse environment – the higher the productivity of aid, therefore if aid is to be conditioned on effectiveness, it should be allocated to more vulnerable countries. The countries with initial low-quality institutions could have gained more from aid. Stating this,

Guillaumont and Chauvet (2001) argue that the aid criteria based on good policies is rather an incentive, but structural vulnerability may serve as a condition and a factor that leads to growth. In terms of variables, the authors suggested including vulnerability index to external and climatic one which is a proxy of weighted instability of agriculture value added to GDP. Index of instability is measured as instability in the real value of exports (short and long term) as well as the trend of the terms of trade, and population size is measured through the log of population. Collier and Dehn (2001) follow this conclusion and include measures of export price shocks in the regression model.

The discussion of the BD model also continued in Collier and Dollar (2002) which revisited the issue (with slightly extended data) and studied the effect of aid allocation on poverty reduction using the anti-poverty budget framework. They employ a headcount poverty rate calculated on a two USD per day poverty line as the dependent variable. Arguing that the policy variables in BD were not comprehensive enough, they use instead World Bank's Country Policy and Institutional Assessment with twenty components. For explanatory variables, a measure of institutional quality (ICRGE), and regional dummies, period dummies to account for the world business cycle, CPIA were used. The evidence suggested that finance is ineffective in inducing either policy reform or growth in a bad policy environment, and inefficient towards poverty reduction. The paper concluded that the presence of large-scale poverty is necessary if aid is to have a large effect on poverty reduction. To maximize poverty reduction, aid should be allocated to countries that have large amounts of poverty and good policy to maximize poverty reduction. After a number of critics, Burnside and Dollar (2004) revisited their analysis in 2004 with updated data of the 1990s and came to the same conclusion as before: foreign aid induces growth provided that there are good policies present. However, they also admit that it is hardly possible to obtain specifications where policies would not be significant.

Easterly et al. (2005) criticized how narrowly the terms of "aid," "policies," and "growth" were defined and reproduced the BD work by redefining aid as Official Development Assistance (ODA) instead of grants and concessional loans, and using alternative indicators for "trade openness" by measuring openness and trade distortions using a black market premium, financial depth (M2/GDP), and growth in trade to GDP as a measure of integration with the global economy and prolonging four year periods to twelve and 24. The authors checked if is it okay to drop five outliers as BD has done, and used the Hadi method for identifying and eliminating outliers as new data was added which demonstrated the same outcome. But keeping

the outliers in the regressions did not change the paper's conclusion. The analysis reduced the confidence of aid conditionality upon policy qualities and that the BD paper must better serve as a debate inducer rather than a final decision roadmap.

While enough attention has been paid to the recipient-side factors of aid effectiveness, a slightly narrower strand of literature studied the characteristics of donors and their impact on effectiveness. A group of researchers also demonstrated that the number of donor organizations in a country matters for aid effectiveness (Acharya et al., 2006; Djankov et al., 2009; Morss, 1984) The recent of them, Djankov et al. (2009) assumed that due to coordination problems and increased transactions costs such as reporting, the multiplicity of donors in a country may not affect growth. The authors used the index of donor fragmentation to present the multiplicity of agencies, where the case of only one donor is presented as 0 and 1 is the highest level of donor fragmentation. In terms of specification, the authors follow the conventional method of Burnside and Dollar (2000) and Hansen and Tarp (2001) and add donors' fragmentation as an explanatory variable. Having run estimations using the GMM, it was demonstrated that the higher the donor fragmentation the less the impact of foreign aid on economic growth. Specifically, if a country moves to the 75th quartile in donors' fragmentation distribution, the growth rate is reduced by one percentage point for every five years. The authors also used alternative proxies for donors' fragmentation: the percentage share of the largest donor and it positively affects the effectiveness, and a dummy variable for the presence of a donor comprising more than 45 percent of all ODA received, and 0 if there is no such donor – which also shows that having one major donor increases the effectiveness of foreign aid on economic growth. Also, the authors estimated how higher competition among donors may lead to increased corruption in a recipient government. The results show that donor fragmentation increases the effect of aid on corruption.

The donor-side characteristics were extended in more recent studies. Berthélemy (2006) classified selfish and altruistic donors, Minoiu and Reddy (2010) concluded that only development aid is growth effective, Kilby and Dreher (2010) discover that aid motivated by donor interests has different growth impact compared to the ones tailored by the recipient's needs. Geopolitical motives tend to adversely impact aid effectiveness according to Dreher et al. (2010). Bermeo (2011) looked at how democratic versus authoritarian donors impact the democratization process in recipient states. Dreher et al. (2015) conclude that the ideological length between donors and recipients negatively influences the effectiveness of aid through additional transaction costs and lower trust.

The complementarity of donor policies and their impact on aid effectiveness was also studied. For example, Minasyan and Nunnenkamp (2016) studied how higher remittances to induce workers' mobility improved the growth effects of aid. Gary and Maurel (2015) develop a measure for consistency in donors' policies and considered aid was a part of seven elements such as trade, migration, technology, security, environment, and aid. They conclude that more consistent policies lead to higher growth. Minasyan et al. (2017) assessed how variations in the quality of funding sources influence income effects of aid. They argue that quality-adjusted aid introduced by Roodman has higher income effects than the nominal amount of aid typically used in foreign aid literature. The ranking of Roodman is created to measure the effective aid, subtracting interest, penalizing aid to more corrupt states. But Roodman's ranking also rewards fiscal incentives for charitable giving for civil society developments. In terms of aid-growth nexus, it makes sense, because only the funds which reach the recipients matter for growth. (Roodman, 2007)

Kilby and Dreher (2010) argued that development-oriented donor aid may lead to higher effectiveness. According to the authors, such development-oriented donors are more prone to apply mechanisms that induce effectiveness. The main goal of the paper was to assess the effects of the Paris Declaration (PD) of Aid Effectiveness in 2005 which served as a breaking point of the old aid approach and the start of the new effectivity-oriented foreign aid. When it comes to methodology, the difference-in-difference analysis of the income effects of donor quality six years before and after the declaration is applied. The recipients of significantly higher quality aid after 2005 aid were considered as a treatment group while the rest was a control group, therefore the treatment was a change in donors' behavior. Employing GDP per capita as the dependent variable, and using some control variables as initial GDP per capita, inflation rate, the share of GDP in trade the authors find out that the quality-adjusted aid was more effective. This was true also when allowing for a delay in effect, the treatment effect became even stronger. Among all countries, smaller recipients benefitted better compared to bigger states.

According to Lundsgaarde et al. (2010), trade determines growth in developing economies and donors use aid as a tool to induce trade with the recipient states, so aid is an outcome of a trade. Moreover, they explain that foreign aid causes structural disadvantages when conditioned by domestic factors such as geography, marketing skills, and lesser product variety.

The importance of the geographical location of the recipients has been studied as well. For example, Dalgaard et al. (2004) give theoretical and empirical analysis to effects of aid on long-run (steady-state) productivity. In a theoretical approach, they define policies of aid distribution of resources among two groups young and old generation. So, the dominance of particular groups would be a distortion of the expropriation of the resources by the government. In the empirical model, the authors run the regression in the style of BD with extensions to the data used by Easterly et al. (2005) and conclude that the aid effectiveness is identified by the share of tropical land in the recipient countries.

When it comes to more recent papers, also there is no final consensus on the effectiveness of foreign aid. While Clemens et.al. (2012), Galiani et.al. (2017) found a positive impact of foreign aid on growth, Rajan and Subramanian (2011) found a negative Dutch Disease effect. The survey of Chauvet and Ehrhart (2018) shows that besides the institutional capacity, the effectiveness of foreign aid depends on exposure to external shocks, structural handicaps, and the interests of the elite, and other factors.

The endogeneity of aid remained a significant problem (Deaton, 2010). It comes both from the fact that poorer governed states tend to attract more aid. Most of the researchers have attempted to solve this issue with the help of Instrumental variables (IV). Brückner (2013) studied reverse causality bias in aid effectiveness in 47 least developed economies. Using international commodity price index and rainfall variables as IV on aid, the author finds a small but significant positive impact on growth. Clemens et al. (2012) recommend lagging aid to accommodate endogeneity. Dalgaard and Hansen (2001) recommend considering non-linearities in aid by including both aid and aid squared in the growth regressions.

A recent flow in the methodology of aid effectiveness is the quasi-experimental approach. However, most of them were used to explain aid flows rather than their effect on growth. For example, Werker et al. (2009) used the dynamics for oil prices as an instrument for aid from Arab countries. Nunn and Qian (2012) instrument dynamics of US wheat production weighted by the tendency to receive food aid to estimate aid effectiveness. Many previous studies have employed the Barro type regression. But the issue with these studies was small samples and too many variables. Here the growth is expressed as a function of initial income and determinants of the steady-state: inflation, inequality, health, climate, fiscal policy, democracy, and others.

Askarov and Doucouliagos (2015) study the impact of foreign aid in transition economies during 1990-2012. Using Burnside and Dollar's (2000) model and a Barro-type growth model, they show that the development aid assistance, on average, had a positive effect on economic performance in transition countries. However, in contrast to Burnside and Dollar, they found no evidence that aid works best in a good policy environment. In addition to assessing the effectiveness of aid, they also control for good policy, trade, religion, natural resources, ethnic fractionalization, and initial conditions.

Chauvet and Ehrhart (2018) solved the endogeneity of foreign aid with respect to aggregate growth issues by changing the traditional dependent variable of GDP growth per capita to firms' sales growth for a panel of 29 developing countries, using the World Bank Enterprise Surveys (WBES) panel datasets. Using the methodology of Tavares (2003) they employ dynamics of the economic situation in donor countries and weigh it according to the historical distance between donors and recipients. There is a dummy for the past colonial relationship between states. Besides that, the authors check the Dutch Disease effect, in other words, whether aid benefits some firms and crowds out others. They assess the impact of aid on firms depending on exogenous industry characteristics such as exports, institutions, external finance, or infrastructure. For example, state-owned firms could benefit more from political connections, or companies of specific industries may benefit lessening the effect on others. The results show there is no different effect neither on firms (partly) owned by states nor by foreign-owned firms, but the slightly higher effect on firms importing their inputs as well as those relying on external finance and experiencing electricity and transport infrastructure constraints exists, and large firms benefit less from aid compared to small-size firms. This suggests that aid tends to relax the financing constraint faced by firms. The results show a positive effect on firm performance, specifically a 10 percent increase in aid leads to five to seven percent growth in sales through easing access to finance and infrastructure.

One of very few works that assess the effect of foreign aid in post-Soviet states is an article by Arazmuradov (2015). He highlights the homogeneity of economic features, historical background and geopolitical location, no access to sea and language in Central Asian states. He studies the short-run impact of foreign capital, or in other words FDI and development assistance on GDP in five Central Asian economies using the structural VAR model in the framework of modified IS-LM-BP. Arazmuradov (2015) states that it is important to study the link between foreign aid and FDI to design new strategies. He explains that the link could lead to a better understanding of a public-private partnership and better domestic investment.

1.5 Effectiveness of Foreign Aid in Central and Eastern Europe

The study of the effects of foreign aid to the Central and Eastern European countries may provide important implications nowadays for other and the same transition economies. After the collapse of the Soviet Union, the donor states diverted their development assistance funds to Eastern European states from other developing states (Dollar and Pritchett, 1998). Since then, the East European countries attracted a significant amount of ODA. To our knowledge, there are no quantitative studies that estimated the macroeconomic effect of foreign aid on economic growth focusing on this region. This is explained by the lack of consistent and comprehensive statistics on the aid to the CEE.

The main priority of the foreign aid from the Western government donors was to assist in the transition to market economies, to privatize what was considered to be inefficient state-owned enterprises (SOE) concentrated on economic projects (Wedel, 2005). The main instruments of foreign aid were a transfer of capital, technology, know-how, and better access to the West. The main goal of the technical assistance was to build an institutional and capital foundation for development until the private investors would be attracted to invest in the region. The aid was provided by Germany, the United Kingdom, other Western European governments, the EU, and the US and coordinated by the EU representing the OECD countries (Pelkmans and Murphy, 1991). The main initial aid programs were PHARE (Poland and Hungary: Assistance for Reconstructing Economies) and TACIS (Technical Assistance for Commonwealth of Independent States) (Treverton, 1992). This was followed by numerous different assistance programs managed by multilateral development institutions such as EBRD, EIB (European Investment Bank), IMF, the World Bank Group which comprised in itself IBRD (International Bank of Reconstruction), IDA (International Development Agency), and IFC (International Finance Corporation) and other agencies (Michalak, 1995).

The Western assistance was officially guided by the "Triple R" agenda meaning Reform, Reintegration, and Regional security. The main principle of the aid was conditionality upon reforms. The financial aid was distributed based on the economic and political reforms accelerating the transition to a market economy, multi-party democracy, free and fair elections, human rights, and rule of law as well as other rules set by IMF and the World Bank. The Western aid was highly criticized by the recipient countries for several reasons because the large share of foreign aid was consumed by consulting fees which mostly were conducted not by locals but by the representatives of the donor countries. Besides, most of the aid was used

to pay debt and repayment of the recipient states. According to Michalak (1995), the main issues with foreign aid in the CEE were related to lack of coordination between donors, various programs, institutions, and the recipients, lack of sufficient data about the amount of aid, and low quality of aid.

1.6 Concluding remarks: What are the synergies between the two pieces of literature?

This chapter is dedicated to a comparison of the existing literature in the field of foreign aid and ESIFs effectiveness in the CEE. In the first section of this chapter, we have discussed how the ESIFs are regulated and implemented, in the second section we reviewed the existing research on the impact evaluation of the ESIFs. The third part was dedicated to the survey of the studies of the effectiveness of the ESIFs in the NMSs of the EU in the region. The fourth part of the chapter is about the role of foreign aid effectiveness literature, with a focus on the foreign aid effectiveness in the CEE region. The purpose of the chapter is to find synergies in the existing two strands of the literature.

Region-wise, we can observe that the previous studies of the ESIFs effectiveness have been mostly limited to the pre-2004 EU-15 regions, and there are very few existing studies focused on the NMSs. Therefore, one of the research areas with the potential to expand is studying the impact of the ESIF on the countries which joined the EU in 2004. There is an emerging debate among researchers on the fact that the integration of these states may have not brought significant competitive advantages to the NMSs. The studies highlight persistent income disparity and over-dependence of the NMSs in the CEE on ESIFs (Glinkina et al., 2014).

As a result of the survey, we defined that the classic empirical framework for both literatures is applying the neoclassical growth model with the relatively recent shift to counterfactual analysis. The majority of papers used Barro-type regression analysis, especially the large share of papers on foreign aid effectiveness. Another synergy is that both strands studied conditional factors of the effectiveness such as quality of institutions, governance, concurrent macroeconomic policies, some structural vulnerabilities as an external economic environment for the states economically dependent on exports of agriculture, for example.

The several potential directions for further research include investigating sectoral responses to the policy funds, disentangling the effects of the ESIFs from other various public and private capital flows, and concurrent policies to Cohesion policy. Besides, using alternative indicators as an outcome of interest and bringing together the structural and the experimental approaches could enhance the literature. In terms of aid effectiveness, we observed the absence of quantitative studies in the assessment of aid effectiveness in transition states of the CEE region. The difference between the two kinds of literature is that the aid is mostly measured at country-level data (although the recent few papers start looking at subnational level as well), while the ESIFs studies naturally include research at the regional level.

Chapter 2: Official Foreign Aid and EU Cohesion Policy: A Comparative Approach

2.1 Introduction

The EU enlargement to Central and Eastern European (CEE) countries has marked 16 years in 2020. The enlargement has led to the creation of an imbalanced single market and increasing economic disparities among the member states of the EU. This required the development of new convergence strategies which would consider the specifics of the new member states (NMSs).

Before becoming recipients of the European Structural Funds, the newly joined EU members were one of the largest foreign aid recipients. Foreign aid is normally related to a broad term called Official Development Finance (ODF) and official development assistance (ODA). While ODF includes all capital flow from donor states and aid agencies (including the loans with interest rates), ODA is a component of ODF that has at least 25 percent of a grant component in it. After World War II, ODA has served as the main foreign source of financing the development of infrastructure and poverty reduction in developing CEE countries. After the breakup of the Soviet Union, the donor states diverted their development assistance funds to the Eastern European states from other developing states (Dollar & Pritchett, 1998). Since then, the East European countries attracted a significant amount of ODA.

Main technical assistance aid programs such as PHARE were also pre-accession financial assistance to these countries. The foreign aid flows to the NMSs continued until they became the EU members and as these countries were considered to be comparatively more advanced than low-income developing aid recipient states, the foreign aid aimed at institutional development and creating a capital base to attract private investors to the region. The foreign aid from the OECD countries was conditional upon the introduction of political reforms towards the market economy and transition to more democratic values and was coordinated by the EU.

Currently, the European Structural and Investment Funds (ESIFs) are the main tool of the EU for correcting regional imbalances with lagging regions. Its importance has increased

even greater with the "fifth wave" of the EU enlargement in 2004 and 2007. Such a scale of enlargement was for the first time in history and increased the number of members from fifteen to 27 (Business & Strategies Europe, 2015). Disparities among the EU-15 and the NMSs in terms of living standards and labor cost and other factors led to the expansion of the ESIFs for better cohesion in the EU (Donaghy and Dall'Erba, 2003). The EU funding of the development in NMSs started from the first of January, 2004. The funds became an indispensable part of the integration process in the EU. With enlargement counting 16 years in 2020, there is an emerging debate among researchers on whether the integration to the EU brought competitive advantages to the NMSs.

Analyzing the variations in GDP per capita, labor productivity and employment rate in the NMSs of the EU during the ten years before and after the enlargement (Table 2.1), we can see that the average growth rate of the region has slowed down after the accession. Overall, the convergence has slowed down particularly after the crisis in 2008-2009. While the variations in employment rate remained almost the same in the region, GDP per capita and labor productivity growth before and after the accession in Baltic and Visegrad countries were significantly higher compared to the rest of the NMSs. We are interested in whether this growth can be related to the effectiveness of the ESIFs and foreign aid that these states enjoyed during 1995-2018. The dynamics in the volume of public and private capital flows are presented in Table 2.2.

The major objectives of the ESIFs are convergence objective, regional competitiveness and employment, and European territorial cooperation objective. Most of the CEE states were assigned the Objective 1 (convergence) category which made them a priority of the Cohesion policy. Objective 1 regions are considered to have "red signals" of underdevelopment such as lack of infrastructure, low level of investment, and high unemployment rate. During the 2000-2006 programming period, Objective 1 was tailored for the regions with a per capita GDP lower than 75% of the community average (Fratesi & Perucca, 2014).

The chapter aims to contribute to the literature on the impact evaluation of the ESIFs and Official Development Assistance in the NMSs and of the EU since 2004 and other neighboring countries in the CEE region. Although the number of studies on the ESIFs effectiveness has been extensively growing, this is the first attempt to make parallels and compare between foreign aid and EU funds. The research will consider country-level data during the 1995-2018 period. We follow the framework used in Coppola et al. (2018). Using a control function approach, we undertake an evaluation of the funds' effects on the basis of a

model of their allocation rules, permitting a better treatment of the selection bias in policy evaluation, and we compare the impact of ESIFs and foreign aid on GDP per capita and labor productivity with the corresponding impact of foreign aid to development in these countries prior (mostly) to 2004. Furthermore, estimating a multi-input multi-output distance function, we separate the impact on GDP per employee (labor productivity) from that on the employment rate.

This chapter is organized as follows: the second section summarizes the literature review, the third section discusses the methodology and research questions of the chapter, section four introduces the dataset and variables used in the empirical analysis, section five presents the results and section six provides concluding remarks of the study.

2.2 Summary of the literature survey

In the first chapter, we conducted a literature survey of the impact evaluation studies of the ESIFs and foreign aid to the NMSs of the EU and neighboring countries. We looked at the existing literature through the four conventional dimensions: empirical framework, outcomes of interest considered, geographical span covered, and the determinants of the effectiveness of the funds.

In terms of methodology, we observed that recently, there have been two broad approaches to the evaluation of regional policies: structural and experimental (Breidenbach et al., 2016). The structural approach applies econometric analysis in accordance with existing growth and convergence theories such as neoclassical growth models (Aiello & Pupo, 2012; Mohl & Hagen, 2010; Rodríguez-Pose & Fratesi, 2004; Rodríguez-Pose & Novak, 2013), Barro convergence (Boldrin and Canova, 2001; Canaleta et al., 2002; Fratesi and Perucca, 2014), augmented conditional convergence model (Esposti and Bussoletti, 2008; Gagliardi and Percoco, 2017; Gallo et al., 2011; Maynou et al., 2016; Percoco, 2017), and Cobb-Douglas production function (Puigcerver-Penalver, 2007).

Experimental approaches usually apply generalized propensity score matching (PSM) or regression discontinuity design (RDD) (Becker et al., 2010; Mitze et al., 2015; Mohl and Hagen, 2010; Pellegrini et al., 2013) and counterfactual analysis for policy impact evaluation (Barone et al., 2016).

In addition to these approaches, the spatial econometric approach is a relatively novel framework and it was found useful in detecting inter-regional spillover effects (Artelaris, 2015; Bivand and Brunstad, 2005; Sassi, 2010). Using spatial econometrics methods, Dall'erba & Le Gallo (2008b) evaluated the impact of the ESIF in 145 EU regions during 1989-1999 and found no spillover effects. Bourdin (2019) studied the effect of Cohesion policy in regional growth in the CEE region using a geographically weighted regression at the NUTS 3 level.

Since most of the reviewed studies analyze growth as a part of a neoclassical growth model, GDP growth per capita is the dependent variable considered most often. Alternative dependent variables are normally related to job creation and labor productivity (De la Fuente and Vives, 1995; Coppola and Destefanis, 2015; Crescenzi and Giua, 2016; Giua, 2017), industrial location patterns (Midelfart-Knarvik and Overman, 2002), and productivity (Esposti and Bussoletti, 2008).

Most of the existing literature assesses the impact of the ESIFs within the pre-2004 fifteen EU member states (Basile et al., 2012; Ederveen et al., 2006; Maynou et al., 2016; Midelfart-Knarvik and Overman, 2002) and at the level of NUTS2 regions (Becker et al., 2012; Beugelsdijk and Eijffinger, 2005; Boldrin and Canova, 2001; Breidenbach et al., 2016; Cappelen et al., 2003; Esposti and Bussoletti, 2008; Le Gallo et al., 2011; LeSage and Fischer, 2008; Pellegrini et al., 2013; Puigcerver-Penalver, 2007; Ramajo et al., 2008; Rodríguez-Pose and Fratesi, 2004; Rodríguez-Pose and Garcilazo, 2015; Rodríguez-Pose and Novak, 2013). There are few existing studies with the quantitative approach which estimated the effect of the ESIFs on economic growth focusing on the NMSs in the CEE region. As we mentioned in the literature survey, this gap in studies of the effects of the ESIFs has been highlighted and reduced in the recent work of Bourdin (2019).

Overall, our literature review showed that there is room for new studies that take into account the role of other policies and public funds besides ESIFs, the role of the fund allocation mechanism in determining their effectiveness, and the peculiar institutional characteristics of the NMSs in CEE economies as well as the identification of effective practices and sectors of intervention. Similar studies considering other public funds have been conducted previously by Cerqua and Pellegrini (2018) which estimated the impact of all concurrent publicly funded projects on local development in Italy during 2007-2015. Coppola et al. (2018) assessed the impact of the EU funds and national funds on GDP per capita of the twenty Italian regions in 1994-2013. We follow the empirical framework used in Coppola et al. (2018) which combined the mentioned structural and experimental approaches and estimated average partial effects of

the ESIFs and national funds using a control-function approach based on the funds' allocation mechanism. As the authors discussed, the existing research on the effectiveness of the Structural Funds focused far more on the impact of the funds rather than on the factors of their distribution. This paper adds value to this gap by modeling the distribution mechanism of the ESIF using economic and political variables.

Before our main specification, we estimate the auxiliary regressions in which the ESIFs and foreign aid are a function of a list of potential determinants including the factors of the political orientation of each member state studied. The main contributions to studying the political factors of the ESIFs' allocation were written by Kemmerling and Bodenstein (2006) and Bouvet and Dall'erba (2010). The authors found the direct impact of the political orientation of the governments on the European regional redistribution policy. Besides economic and social criteria for receiving the funding, Bouvet and Dall'erba (2010) studied the influence of the national and regional level political data. They concluded that the left-wing and Euro-sceptical governments, as well as better alignment between national and regional governments directly influence the ESIFs distribution, and the effect varies depending on the objective of the funding. Kemmerling and Bodenstein (2006) also analyzed the effect of partisan politics on the allocation of regional funding through affecting the behavior of governments and lobbying their interests in the EU Commission. The estimation demonstrated a visible but not always robust relationship between partisanship and the ESIFs policy.

2.3 Objectives and methodology

Despite these major similarities between foreign aid and the ESIFs, there are no studies that construct parallels among public capital flows from the EU funds and development agencies. We would like to bring novelty to the existing literature by comparing the effect of the ESIFs and foreign aid and considering the funds' distribution mechanisms in evaluating the effect. Considering country-level data for the 1995-2018 period, we compare the effect of ODA (before accession) with that of ESIFs (after accession) on the GDP per capita and its components of the NMSs and other neighboring countries. Our research questions are as the following:

1. Were the ESIFs actually more "cohesive" than ODA for all NMSs or were they just more massive?

2. Did different funds have different impacts? Was this not true for various country groups within the region?
3. Were ESIFs more "cohesive" than ODA as far as the employment rate was concerned?

In order to answer these questions, we ground our approach within Solow's augmented neoclassical growth model. This framework was previously applied by Beugelsdijk and Eijffinger (2005), Ederveen et al. (2006), Aiello and Pupo (2012), Le Gallo et al.(2011) for the assessment of ESIFs effectiveness. According to Wooldridge (2002, ch.10), for the purposes of impact evaluation, it is better to rely upon a fixed-effect dynamic panel model. As a further way of dealing with the selection bias problem deriving from the non-random allocation of cohesion funds, it is useful to resort to the control function approach (Heckman and Hotz, 1989; Wooldridge, 2004; Cameron and Trivedi, 2005, ch.25). According to this approach, we can assume that these funds are randomly allocated, once due care has been taken of a set of observable covariates. Therefore, using standard regression analysis we estimate an average treatment effect of policies (here an average partial effect, as funds are continuous variables) through a 'kitchen sink' regression (Wooldridge, 2004) that includes the treatment (ESIFs) along with other variables determining the response variable and/or policy allocation. The control function approach is particularly convenient in our application for the following reasons. First, although there have been in time some explicit rules presiding to the allocation of funds between regions (especially as far as the Convergence objective of the ESIFs was concerned), these rules have never fully presided to the allocation of funds, even in the case of EU funds. An important consequence of this state of affairs is that in our sample there are no regions that do not receive any kind of funding. This is true for EU funds, and all the more so for ODA. Hence a counterfactual strategy based on the creation of a control group (for instance, receiving no funding) cannot be enacted in our case. Besides, the 'kitchen sink' set-up is very convenient in our case because it is readily adapted to the modeling of multiple continuous treatments (the various policy funds, some of which we may want to jointly include in a regression). We also run a multi-input multi-output distance function to separate the impact on GDP per employee (labor productivity) from the effect on the employment rate.

Our analysis starts with the following baseline GDP per capita equation:

$$\mathrm{Dy}_{it} = \alpha_1 \gamma_{it-1} + \alpha_2 gfi_{it} + \alpha_3 \Delta pop_{it} + \alpha_{4j} F_{jit} + \alpha_{6j} W_{it-1} + \alpha_i + \alpha_t + \varepsilon_{it} \quad (2.1)$$

where $\mathrm{D}y_{it}$ is a (log) variation of GDP per capita, i stands for member states, t is years, γ_{it-1}- is a lag of the dependent variable which allows for the dynamic structure, gfi_{it} is a (log) ratio of gross fixed investment in GDP, Δpop_{it}- the (log) variation of the population respectively, F_{jit} stand for the (log) variation of funds paid by the ESIFs and net official development assistance (ODA) and official aid (also indexed by j). Vector W_{it-1} includes the variables presiding over the regional allocation of the funds. The variables included in the vector W_{it-1} are selected through estimation of a set of auxiliary regressions in which the ESIFs and foreign aid are posited to be a function of a list of potential determinants. The selection of a parsimonious specification of these equations consistent with satisfactory diagnostics provides us with the indication of the relevant set of W_{it-1} variables. The vector W_{it-1} may include linear and quadratic trends, sectoral and cyclical variables, and politically based indicators as the political orientation of each government. Wooldridge (2004) demonstrates that equation (2.2) can consistently estimate the average partial effect (that is, the average treatment effect) of the policy on the response variable, provided that funds are continuous variables, and are a linear homoscedastic function of W_{it-1} and the other regressors in (2.3). Given that we deal with continuous policy treatments, we can take continuity for granted, and test for the other conditions (functional form, homoscedasticity) when we estimate the auxiliary regressions. The variables a_i and a_t are, respectively country and year fixed effects, and ε_{it} is an independent and identically distributed error term.

Regressing only GDP per capita on paid funds may overpass the effects on its components, GDP per employee, and employment rate. Equally, just regressing either GDP per employee or employment rate separately on funds and other variables would assume away both the impact of the funds on the other variable of interest (either the employment rate or GDP per employee), as well as the impact of the other variable of interest on the variable under scrutiny. Indeed, these two variables are likely to be jointly determined, and there could be complementarity or substitution effect between them: we would also neglect that these variables are jointly determined. Simply including the employment rate in an equation for GDP per employee (or the other way around) along with the other regressors would not be a satisfactory way of modeling this nexus. In this case, we would implicitly assume that GDP per employee (or the employment rate) is not affected by the funds.

Considering this, we draw upon the literature on multi-output multi-input transformation functions (Coelli & Perelman, 1999; Kumbhakar, 2012, 2013), and model the relationship between GDP per employee, employment rate, and funds as:

$$x_{it} = -a_1(r_{it} - x_{it}) + a_2 x_{it-1} + a_3(r_{it-1} - x_{it-1}) + a_4 gfi_{it} + a_5 F_{jit} + \\ - a_6 D.pop_{it} + a_7 W_{it-1} + a_i + a_t + e_{it} \quad (2.2)$$

Where, x_{it} and r_{it} are respectively (log) variations of GDP per employee and employment rate in each country, *i* stands for countries, *t* for years, and other variables are as described for the equation (2.1). Further, we expand the (2.2) by adding interaction terms between policy funds and the employment rate normalized by GDP per employee, $(r_{it} - x_{it})$:

$$x_{it} = -a_1(r_{it} - x_{it}) + a_2 x_{it-1} + a_3(r_{it-1} - x_{it-1}) + a_4 gfi_{it} + a_5 F_{jit} + \\ - a_6 D.pop_{it} + a_7 W_{it-1} + a_i + a_t + e_{it} \quad (2.3)$$

To see whether policy funds have a stronger impact on either GDP per employee or employment rate, we provide below the long-run solutions of (2.3) for each variable. For the sake of simplicity, we work on a simplified version of (2.3), including only GDP per employee, employment rate, and the funds. The derivation is detailed in the Appendix:

$$x_i = \frac{-(a_1 - a_3 - a_{52}F_i)}{(1 - a_1 - a_2 + a_3 + a_{52}F_i)} r_i + \frac{a_{51}}{(1 - a_1 - a_2 + a_3 + a_{52}F_i)} F_i + \cdots \quad (2.4)$$

$$r_i = \frac{-(1 - a_1 - a_2 + a_3 + a_{52}F_i)}{(a_1 - a_3 - a_{52}F_i)} x_i + \frac{a_{51}}{(a_1 - a_3 - a_{52}F_i)} F_i + \cdots$$

In this case, funds favor the employment rate, in the sense that a higher a_{52} increases the long-run impact of funds on this rate and dampens the long-run impact of funds on GDP per employee. Yet, things would go the other way around if a_{52} had a negative sign in (2.3).

2.4 Dataset

We use annual national accounts, political and socio-economic variables from eighteen countries in Central and Eastern European (CEE) countries during 1995-2018. There are various definitions and classifications of the CEE region. While the general term covers Eastern Bloc countries in Central and Eastern Europe and the Balkans, the contemporary literature on the EU enlargement refers to the Visegrád Four (Czech Republic, Hungary, Poland, Romania, and Slovakia) the Baltic Three (Estonia, Latvia, and Lithuania) and Slovenia which joined the EU in 2004. The OECD definition of the region adds Albania, Bulgaria, and Croatia to this term.

As we study the impact not only of the EU funds but also of foreign aid, we consider the broader term of the transition economies in the CEE and include the following eighteen countries in our analysis: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Cyprus, Latvia, Lithuania, Macedonia, Malta, Montenegro, Poland, Romania, Serbia, Slovakia, and Slovenia. We estimate the impact of the European Regional Policy and foreign aid separately for the different samples as well considering an aggregate impact on all of them. We observe the impact separately in the following country samples:

1) all the countries in the sample (All countries);
2) non-EU countries in the region (non-EU)6;
3) all EU NMSs in the sample (EU);
4) the NMSs which joined the EU in 2004 (EU-2004);
5) the Visegrád Four, the Baltic Three, and Black Sea states (BVB);
6) only the Visegrád Four and the Baltic Three (BV).

We assume that using data prior to 1995 would bring about little useful information, as economies in the CEE region were in a state of turmoil in previous years, and using country-level information is not an unduly restrictive assumption when studying the impact of ESIFs.

6 Using this sample allows the estimation of the impact of foreign aid over a longer time period than for the other countries.

The information on the ESIF transfers by years and the fund types are taken from the most recent dataset of "Historic EU payments - regionalized and modeled," provided by the European Commission[7]. The data on the volume of "Net official development assistance and official aid received" from 1995 to 2018 is retrieved from the World Bank Development Indicators databank[8]. The dataset is originally compiled by The Organization for Economic Cooperation and Development's Development Assistance Committee (OECD DAC). All the funding variables are presented as a share of GDP.

The data on GDP, population, unemployment rate, employment, economically active population, GVA, deflators, and gross fixed capital formation (private investment), for 1995-2018 were retrieved from the Eurostat regional accounts and national accounts source[9]. The data on the share of employment in agriculture[10] and industry[11] were taken from the World Development Indicators dataset.

As a proxy for the political orientation of the governments, we use the percentage of votes gained by "socialist and other leftist parties" and "social democratic parties" for left-wing parties. Tables 2.3-2.5 present the detailed list of the parties and the elections years considered. The classification into ten party families and the dataset itself were retrieved from the Manifesto Project Dataset[12]. This dataset is prepared by WZB Berlin Social Science Center and covers election manifestos of political parties at national elections in 56 countries between 1920 and 2018. Their dataset is based on publicly available election statistics and election programs.

7 "Historic EU payments - regionalised and modelled," European Commission - DG REGIONAL POLICY.

8 "Net official development assistance and official aid received," Development Assistance Committee of the Organisation for Economic Co-operation and Development, Geographical Distribution of Financial Flows to Developing Countries, Development Co-operation Report, and International Development Statistics database.

The term of foreign aid is normally related to a broad term called official development finance (ODF) and official development assistance (ODA). While ODF includes all capital flow from donor states and aid agencies (including the loans with interest rates), ODA is a component of ODF which has at least 25 per cent of a grant component in it.

9 Annual National Accounts, Eurostat.

10 Employment in industry (percent of total employment), modeled ILO estimate

11 Employment in agriculture (percent of total employment), modeled ILO estimate

12 Manifesto Project Main Dataset (Party Preferences)

2.5 Findings

We estimate allocation mechanism separately for ODA and each ESIF, using the following variables as regressors: lags of GDP per capita and gross GDP, population growth rate, private investment (gross fixed investment), lags of ODA and the ESIF, employment, share of employment in agriculture and industry, the total unemployment rate as well as political variables.

The annual ESIFs data follows the cycle of the European Commission (EC) payment periods to the Member States and not the date on which expenditures took place on the ground. In order to develop an estimate of the latter, the EC developed modeling of the actual annual expenditure on the ground presented as "modeled" funds versus "paid". We provide the estimation results for the "paid" expenditure for the following reasons. Firstly, because we felt that it made more sense to ground the auxiliary regressions for the "kitchen sink" approach on actually paid funds. Secondly, when it comes to the EU-2004 country group, we observe that the "modeled" funds have the undesirable feature of beginning before these countries joined the EU. Last but not least, the dataset on the net ODA is not given in the same "paid" and "modeled" versions, which would make the effects of foreign aid and the ESIFs not wholly comparable in the second stage estimations.

We present our evidence in Tables 2.6 - 2.10 in the Appendix. Virtually all estimations demonstrated satisfactory diagnostics for serial correlation, heteroskedasticity, and functional form. We present these diagnostics for the first-stage auxiliary regressions as they are a prerequisite for the 'kitchen sink' approach as explained in Wooldridge (2004). As all the countries under scrutiny a given country receives either ODA or ESIFs, we have restricted estimation of the auxiliary regressions to the observations where either ODA or a given ESIF have positive values. In this manner, we get much better diagnostics, which is reasonable because the covariates we can use in these auxiliary regressions are not likely to model the switch from non-zero to zero values (or conversely) for any policy variable. We also note that the final specifications reported below include regressors that had a t-ratio above unity, or that were instrumental in improving the diagnostics of the estimate.

Table 2.6 presents regression outputs for the five country samples with ODA as the dependent variable. From this table, we can observe that only the lagged values of ODA, lagged private investment, population growth rate, election turnout and the share of left-wing parties

in government have some kind of consistent influence on the amount foreign aid received. We recall that all the first-stage auxiliary regressions include linear and quadratic country-idiosyncratic trends. Diagnostics are reasonably good, but for the presence of heteroskedasticity in the "All countries" sample, which may be rationalized on the grounds of the heterogeneous nature of this sample.

Table 2.7 presents the results of auxiliary regressions for the Cohesion fund allocation. Hence the regressors include the previously mentioned macroeconomic and political variables as well the lags of the Cohesion Fund and the other three ESIFs. Overall, the paid amount of the Cohesion fund is negatively correlated to lagged GDP and positively related to lagged private investment, and, to some extent, to lagged ESF. Diagnostics are good. Table 2.8 provides results for the European Agricultural Fund for Rural Development (EAFRD). This fund is to some extent negatively influenced by lagged population growth rate and, more extensively, by the fund's lagged value. A larger share of employment in industry and a higher unemployment rate led to larger amounts of EAFRD received in all the country groups. On the other hand, in the Baltic, Visegrad, and the Black Sea states the dominance of left-wing parties negatively affected the amount of EAFRD. In the case of this fund, diagnostics are less good as far as heteroskedasticity is concerned, which must be kept in mind when assessing the evidence about this fund's impact. Table 2.9 presents the results for the European Regional Development Fund (ERDF). This fund is negatively related to lagged GDP in all the samples (mostly with significant coefficients), while it is positively related to lagged private investment as well as with to lagged EAFRD and ESF. There is also some evidence of a negative association with the lagged share of employment in agriculture and of a positive association with the presence of left-wing parties in government. Diagnostics are good. Finally, Table 2.10 deals with the European Social Fund (ESF). This table shows a very strong positive association with the unemployment rate. Also, the ESF shows some positive correlation with ERDF and EAFRD, and, to a lesser extent, with the election turnout rate. Diagnostics are reasonably good.

Summing up the evidence for the auxiliary regressions, we find some mild complementarity effects among the ESIFs. There is also evidence of countercyclical behavior, either as a negative association to GDP or GDP per capita or as a positive association with the unemployment rate.[13] Among the political variables, the presence of left-wing parties in government shows a negative relationship with the allocation of ODA, EAFRD, while being

13 The procyclical reaction of ERDF to private investment is a rather unique case.

positively correlated with the ERDF. Election turnout positively influenced ODA and ESF, while having a negative impact on the paid amount of EAFRD and ERDF.

Sectoral variables have some relevance only for the EAFRD and ESF (with the share of employment in the industry), and much less, for the ERDF (with the share of employment in agriculture). Generally speaking, results are rather heterogeneous across country groups and the diagnostics are sufficiently good.

Tables 2.11 – 2.13 present the evidence for equations (2.1) – (2.3). We first provide in Tables 2.11-2.13 the evidence obtained including the funds' allocation controls, W_{it-1}. These are of course our findings of interest. Then, in Tables 2.14-2.16 we provide the results that have been obtained excluding the W_{it-1} vector from the estimated equations. We do this in order to show that allowing for the funds' allocation process through the W_{it-1} vector actually makes a difference in the kind of evidence obtained. In no case, however, do we show the vector of the controls in the tables. Actually, in order to be more concise and focused on the variables of interest we do not report results for the lagged dependent variables.

Table 2.11 provides the results for equation (2.1) across the various country samples. The results indicate a significant positive impact of gross fixed investment on GDP per capita across all the country samples except for the non-EU countries sample (where however significance at the 10% level is reached for the joint impact of current and lagged investment). ODA has on the other hand a significant (positive) effect only in the non-EU sample. The Cohesion fund generally exhibits a significant positive effect, with a particularly strong effect of its lagged version in the EU-2004 and Baltic & Visegrad states. At any rate, significance at the 10% level for its joint of current and lagged impact is reached in all the samples restricted to EU countries. The EAFRD has a somewhat erratic pattern. Once more, we find a particularly significant positive effect for its lagged value in the EU-2004 and Baltic & Visegrad states. However, in the BV countries, current EAFRD has a negative and significant effect, and the joint (current and lagged terms') significance is highest for the whole EU sample. The ERDF did not show up significantly in any sample, with the possible exception of BVB countries, where lagged ERDF has a positive effect, and approaches significance at the 10% level. Given the low significance of ERDF in the BV countries, it can be surmised that the ERDF is only significant for Bulgaria and Romania. Finally, lagged ESF has a negative effect on GDP per capita in the overall sample, and across the EU-2004, in BVB and BV country samples. The joint negative significance of the current and lagged terms is also achieved for the overall and the EU-2004 sample.

Summing up, we can conclude that private investment has a very strong and pervasive impact, especially for EU countries. ODA does not have any significant impact throughout NMSs but is positive and significant for non-EU countries. ESIFs have on the whole a positive and significant impact on GDP per capita, but there is considerable heterogeneity across country groups and fund types. The negative impact of ESF on GDP per capita is particularly worthy of consideration, and we shall come back to it below.

Table 2.12 reports the evidence from equation (2.2) across the country samples already considered above. The utilization of the output transformation function leads to a higher fit, as expected a priori, since we are using information from a GDP capita component, r, to explain the other, x. The significance of the coefficients of interest basically replicates the previous evidence, while their size is a bit smaller. When turning the attention to Table 2.13 that reports the results for (2.3), inclusive of interaction terms, one notes that the latter is basically not significant for any expenditure variables. The interaction coefficient achieves some significance only for the variation of the population in the EU-2004 and BVB samples. Its negative sign means that faster growth of population penalizes the employment rate, which makes some a priori sense.

Finally, when looking in Tables 2.14-2.16 at the results that have been obtained excluding the W_{it-1} vector from the estimated equations, we can see that allowing for the funds' allocation process through the W_{it-1} vector brings about some differences in the size and significance of policy funds. In general, the policy funds are less significant. Dealing with the selection bias through the "kitchen sink" approach suggested by Wooldridge (2004) sharpens the assessment of the policies examined in the present study.

When summing up the results obtained about the impact of policy funds on GDP per capita and its components, we can say the following things. First of all, the wide significance of gross fixed investment in the determination of GDP per capita is an important signal of the appropriateness of the specification and the data we used. The coefficient on investment also provides a benchmark for the size of the coefficients of the various policy funds. About the latter coefficients, we can say that the ESIFs have a significant impact on GDP per capita while ODA had no impact throughout the NMSs of the EU. It is however true that ODA achieves a particularly strong effect in the non-EU sample. Lagged EAFRD has a positive impact comparable to that of the Cohesion Fund in the EU-2004 sample. Finally, as already recalled, the ESF has, when significant, a negative impact on GDP per capita. This impact is weak in absolute terms but calls into question the validity of the policy interventions carried out through

this channel. Further research on this matter is certainly warranted. When splitting GDP per capita in GDP per employee and employment rate, we did not find evidence of strong differences in the effect of policy funds upon these two components of GDP per capita.

Generally speaking, the impression of a considerable heterogeneity of effects across country groups and fund types is confirmed. The relatively weaker effect of ESIFs in BV and BVB countries is reminiscent of the results found in Bourdin (2019), where ESIFs have a strong impact on GDP per capita only in regions close to the rest of the EU. In this sense, our evidence has an exploratory character and only opens up avenues of future research for a deeper look at the structural features of the CEE region and the determinants of policy effectiveness in it. A final remark concerns the lack of significance of the variation in the population, a feature characterizing all our specifications. This phenomenon is linked to the presence of linear and quadratic time trends in the estimates. Without them, the significance of the variation of population, a characteristic aspect of the Solovian growth model, increases decisively. Yet, linear and quadratic time trends are always significant in the estimates and control for a host of factors (technical progress, structural change, etc.) not simply linked to the funds' allocation process. The search for a more articulated specification of these effects must be left to future research.

2.6 Concluding Remarks

In this chapter, we studied the impact of official transfers, specifically official development assistance and European Structural and Investment Funds on the GDP per capita and its components of member states that joined the EU recently and other neighboring countries. Developing upon the methodology used in Coppola et al. (2018), we undertake an evaluation of the funds' effects on the basis of a model of their allocation rules, thus dealing with the selection bias inherent in policy evaluation. We consider country-level data for the 1995-2018 period and compare the effect of ODA (before accession) with that of ESIFs (after accession). Estimating a multi-input multi-output distance function, we also separate the impact on GDP per employee (labor productivity) from that on the employment rate. Our estimates show that gross fixed investment and ESIFs (in particular the Cohesion Fund) have a significant positive impact on GDP per capita while the impact of ODA is significant only in countries that have not joined the EU. The ESF and EAFRD negatively (but weakly) affected outcomes of interest, and the ERDF seems to have a negative impact on GDP per employee in

Baltic & Visegrad countries. We did not find evidence of strong differences in the effect of policy funds upon GDP per employee and employment rate, but for some evidence in favor of the Cohesion fund wielding a stronger effect on the employment rate of Baltic and Visegrad states than on GDP per employee.

Appendix 2.1

Table 2.1 Convergence analysis in the NMSs of the EU

Convergence analysis in all the NMSs					
	1995	**2004**	% growth	**2015**	% growth
GPD per capita (euros, at 2005 prices)					
weighted mean	9548	12567	3,51%	14536	1,42%
CV	0,44	0,4		0,31	
GPD per employee (euros, at 2005 prices)					
weighted mean	22577	28494	2,91%	32772	1,36%
CV	0,4	0,37		0,31	
Employment rate					
weighted mean	0,42	0,42		0,44	
CV	0,1	0,1		0,07	
Convergence analysis in A10 countries					
	1995	**2004**	% growth	**2015**	% growth
GPD per capita (euros, at 2005 prices)					
weighted mean	10104	13412	3,64%	15526	1,43%
CV	0,44	0,36		0,24	
GPD per employee (euros, at 2005 prices)					
weighted mean	23871	30091	2,90%	34757	1,41%
CV	0,4	0,32		0,31	
Employment rate					
weighted mean	0,43	0,43		0,45	
CV	0,1	0,1		0,05	
Convergence analysis in Baltic and Visegrad member states					
	1995	2004	% growth	2015	% growth
GPD per capita (euros, at 2005 prices)					
weighted mean	6591	9422	4,77%	12866	3,32%
CV	0,33	0,22		0,16	
GPD per employee (euros, at 2005 prices)					
weighted mean	16342	22185	3,97%	28409	2,55%
CV	0,26	0,17		0,14	
Employment rate					
weighted mean	0,42	0,42		0,45	
CV	0,1	0,1		0,06	
Source: Eurostat					

Table 2.2 Official monetary transfers to the NMSs of the EU and neighboring countries during 1995-2015

	All NMSs		**A10 countries**		**BV countries**	
	1995-2004	**1995-2004**	**1995-2004**	**2005-2015**	**2005-2015**	**2005-2015**
GFI	0,2383	0,2503	0,2597	0,2381	0,2325	0,2323
ODA	0,0077	0,0068	0,0081	0	0,0000	0,0001
CF	0,0003	0,0010	0,0005	0,0057	0,0058	0,0043
EAFRD	0	0,0004	0,0001	0,0029	0,0030	0,0023
ERDF	0,0001	0,0017	0,0002	0,0079	0,0079	0,0057
ESF	0	0,0007	0,0001	0,0022	0,0023	0,0017

Table 2.3 The list of socialist or other left-wing parties in the NMSs of the EU

Country	**Party name**	**Party family**
Croatia	Croatian Laborists - Labor Party	Socialist or other left parties
Croatia	Social Democratic Party of Croatia	Socialist or other left parties
Croatia	The Only Option Coalition	Socialist or other left parties
Czech Republic	Communist Party of Bohemia and Moravia	Socialist or other left parties
Czech Republic	Left Bloc	Socialist or other left parties
Estonia	Electoral Union 'Secure Home'	Socialist or other left parties
Hungary	Democratic Coalition	Socialist or other left parties
Hungary	Together 2014 -Dialogue for Hungary Electoral Alliance	Socialist or other left parties
Latvia	Concord Centre	Socialist or other left parties
Latvia	Harmony for Latvia - Rebirth of the Economy	Socialist or other left parties
Latvia	Latvian Unity Party	Socialist or other left parties
Latvia	National Harmony Party	Socialist or other left parties
Latvia	Social Democratic Party Harmony	Socialist or other left parties
Lithuania	Lithuanian Democratic Labour Party	Socialist or other left parties
Romania	Democratic National Salvation Front	Socialist or other left parties
Romania	Party of Social Democracy of Romania	Socialist or other left parties
Romania	Social Democratic Party	Socialist or other left parties
Romania	Social Democratic Pole of Romania	Socialist or other left parties
Slovakia	Communist Party of Slovakia	Socialist or other left parties
Slovakia	Workers' Association of Slovakia	Socialist or other left parties
Slovenia	United Left	Socialist or other left parties
Slovenia	Unity, Associated List	Socialist or other left parties
Source: The Manifesto Project		

Table 2.4 The list of social democratic parties in the NMSs of the EU and neighboring countries

Country	Party name	Party family
Bulgaria	Alternative for Bulgarian Revival	Social democratic parties
Bulgaria	BSP for Bulgaria	Social democratic parties
Bulgaria	BSP-Left Bulgaria	Social democratic parties
Bulgaria	Bulgarian Socialist Party	Social democratic parties
Bulgaria	Coalition for Bulgaria	Social democratic parties
Bulgaria	The coalition of Bulgarian Socialist Party, Bulgarian Agrarian People's Union - Alexandar Stambolijski and Political Club 'Ekoglasnost'	Social democratic parties
Bulgaria	Democratic Left	Social democratic parties
Bulgaria	Euroleft Coalition	Social democratic parties
Croatia	Croatia is growing	Social democratic parties
Croatia	Kukuriku Coalition	Social democratic parties
Croatia	People's coalition	Social democratic parties
Cyprus	Citizens' Alliance	Social democratic parties
Cyprus	Progressive Party of the Working People	Social democratic parties
Cyprus	United Democratic Union of Cyprus	Social democratic parties
Czech Republic	Czech Social Democratic Party	Social democratic parties
Czech Republic	Czechoslovak Social Democratic Party	Social democratic parties
Estonia	Estonian Social Democratic Party	Social democratic parties
Estonia	People's Party Moderates	Social democratic parties
Estonia	Social Democratic Party	Social democratic parties
Hungary	Hungarian Social Democratic Party	Social democratic parties
Hungary	Hungarian Socialist Party	Social democratic parties
Latvia	For Human Rights in a United Latvia	Social democratic parties
Latvia	Latvian Social Democratic Alliance	Social democratic parties
Lithuania	A. Brazauskas Social Democratic Coalition	Social democratic parties
Lithuania	Lithuanian Social Democratic Party	Social democratic parties
Lithuania	Working for Lithuania	Social democratic parties
Malta	Labour Party	Social democratic parties
North Macedonia	Democratic Renewal of Macedonia	Social democratic parties
Poland	The coalition of the Democratic Left Alliance and the Union of Labour	Social democratic parties
Poland	Democratic Left Alliance	Social democratic parties
Poland	Democratic Union	Social democratic parties
Poland	Left and Democrats	Social democratic parties
Poland	Union of Labour	Social democratic parties
Romania	Democratic Party	Social democratic parties
Romania	National Salvation Front	Social democratic parties
Romania	Social Democratic Union	Social democratic parties
Romania	Social Liberal Union	Social democratic parties
Slovakia	Common Choice	Social democratic parties
Slovakia	Direction-Social Democracy	Social democratic parties
Slovakia	Party of the Democratic Left	Social democratic parties
Slovenia	Associated List of Social Democrats	Social democratic parties
Slovenia	Associated List of Social Democrats	Social democratic parties
Slovenia	Social Democratic Party	Social democratic parties
Slovenia	Social-Democratic Party of Slovenia	Social democratic parties
Slovenia	Zoran Janković's List - Positive Slovenia	Social democratic parties
Source: The Manifesto Project		

Table 2.5 The years of election considered for calculating the share of votes for leftist parties in the NMSs of the EU

Member state	**Elections included**
Bulgaria	1994, 1997, 2001, 2005, 2009, 20013, 2014, 2017
Croatia	1995, 2000, 2003, 2007, 2011, 2015, 2016
Czech Republic	1992, 1996, 1998, 2002, 2006, 2010, 2013, 2017
Estonia	1995, 1999, 2003, 2007, 2011, 2015
Hungary	1994, 1998, 2002, 2006, 2010, 2014
Cyprus	1991, 1996, 2001, 2006, 2011, 2016
Latvia	1995, 1998, 2002, 2006, 2010, 2011, 2014
Lithuania	1992, 1996, 2000, 2004, 2008, 2012, 2016
Malta	1992, 1996, 1998, 2003, 2008, 2013
Poland	1993, 1997, 2001, 2005, 2007, 2011, 2015,
Romania	1992, 1996, 2000, 2004, 2008, 2012, 2016
Slovakia	1994, 1998, 2002, 2006, 2010, 2012, 2016
Slovenia	1992, 1996, 2000, 2004, 2008, 2011, 2014
Source: The Manifesto Project	

Legend of Tables 2.6 -2.16

Region and year fixed effects are always included in the estimates, and not shown in the interest of parsimony. For all regressors, we report coefficients and p-values (the bracketed values below the coefficients). Standard errors are heteroskedasticity-robust. N is the number of observations, adj. R^2 is the coefficient of determination adjusted for degrees of freedom not inclusive of the effect of region and year fixed effects. C-W is the Cook-Weisberg test for heteroskedasticity, A-B is the Arellano-Bond test for first-order serial correlation, R is the Reset test for functional form and omitted variables (we include quadratic and cubic terms of fitted values). Unless otherwise stated, all these variables are in natural logarithms. In tables 2.11-2.16, no lagged dependent variables are shown in order to save space.

List of variables and abbreviations

GDP at constant prices	GDP
GPD at constant prices divided by population	GDP per capita
GDP at constant prices divided by employment	GDP per employee
Population growth rate	Pop.growth rate
Gross Fixed Capital Formation/GDP	GFI
Net official development assistance and official aid/ GDP	ODA
Total employment	Employment
Total employment/population	Employment rate
Employment in agriculture (% of total employment)	share of empl. in agr.
Employment in industry (% of total employment)	share of empl. in ind.
Total unemployment rate	Tot. unemployment rate
Percentage of votes gained by socialist or other left parties	Left-wing
Turnout percentage in legislative elections, 1995-2018	Election turnout
EU structural funds (Cohesion Fund) / GDP	CF
EU structural funds (European Agricultural Fund for Rural Development)/GDP	EAFRD
EU structural funds (European Regional Development Fund)/GDP	ERDF
EU structural funds (European Social Fund)/GDP	ESF
(log) Employment rate - (log) GDP per employee	(r - x)
Year	t
One-year lagged variable	(t – 1)
Two-years lagged variable	(t – 2)

Table 2.6 Auxiliary Regressions for the Allocation Mechanism of Net official development assistance and official aid received, dependent variable: ODA

	Country groups					
Regressors	all countries	non-EU	EU	EU 2004	BVB	BV
GDP per capita (t-1)		5.051+	-0.905			
		(0.139)	(0.384)			
Pop. growth rate (t-1)		-10.35			-10.02+	
		(0.513)			(0.170)	
GFI (t-1)	-0.209	-0.758+		0.00490	0.276	0.754
	(0.349)	(0.184)		(0.990)	(0.655)	(0.426)
ODA (t-1)	0.442***	0.282+	-0.0728	0.126**	-0.519***	-0.605***
	(0.002)	(0.187)	(0.744)	(0.041)	(0.004)	(0.004)
ODA (t-2)	-0.0640	-0.323+	-0.231**	-0.0916	-0.446**	-0.463**
	(0.588)	(0.120)	(0.042)	(0.472)	(0.011)	(0.020)
Share of empl.in agr.(t-1)		-4.496	4.623		3.140	6.217
		(0.287)	(0.433)		(0.552)	(0.456)
Share of empl.in ind. (t-1)			6.646		3.103	1.517
			(0.331)		(0.565)	(0.734)
Tot. unempl. rate (t-1)			0.0341			
			(0.251)			
Election turnout (t-1)	0.00502	0.0223*	0.0154	0.00870		
	(0.250)	(0.078)	(0.254)	(0.416)		
Left-wing (t-1)	-0.0160**	-0.0269*	-0.00966	0.0167		
	(0.018)	(0.053)	(0.316)	(0.400)		
N	193	80	106	80	70	56
R^2	0.399	0.910	0.798	0.256	0.766	0.769
adj. R^2	0.344	0.904	0.773	0.172	0.739	0.745
Linear trends	no	yes	no	no	yes	yes
Squared trends	no	yes	no	no	yes	yes
AB	0.362	0.214	0.957	0.143	0.080	0.148
R	0.329	0.201	0.150	0.186	0.591	0.824
CW	0.000	0.241	0.026	0.019	0.115	0.741
IM-test	0.466	0.447	0.454	0.447	0.443	0.437
p-values in parentheses						
+ p<0.2, * p<0.1, ** p<0.05, *** p<0.01						

Table 2.7 Auxiliary Regressions for the Cohesion Fund Allocation Mechanism, dependent variable: CF

	Country groups			
Regressors	EU	EU 2004	BVB	BV
GDP per capita (t-1)	-4.571**	-3.792***	-3.313***	-5.368+
	(0.010)	(0.005)	(0.007)	(0.110)
Pop. growth rate (t-1)		-10.41	-3.678	
		(0.408)	(0.696)	
GFI (t-1)	0.492	1.631***		2.172
	(0.411)	(0.008)		(0.222)
GFI (t-2)				-0.724
				(0.485)
CF(t-1)	0.0329	0.0384	0.0529	-0.169
	(0.504)	(0.568)	(0.598)	(0.206)
EAFRD (t-1)		-0.0789		
		(0.205)		
ESF (t-1)	0.112**	0.0720+	0.0780**	0.0339
	(0.027)	(0.145)	(0.011)	(0.698)
Share of empl.in agr.(t-1)	-4.069	-1.597		-19.78
	(0.550)	(0.788)		(0.301)
Share of empl.in agr.(t-2)				-2.087
				(0.866)
Share of empl.in ind. (t-1)				8.521
				(0.381)
Tot. unempl. rate (t-1)	-0.0267	-0.0168		0.0519
	(0.218)	(0.271)		(0.451)
Tot. unempl. rate (t-1)				
N	217	171	162	126
R^2	0.641	0.749	0.749	0.828
adj. R^2	0.622	0.736	0.737	0.821
Linear trends	no	no	no	yes
Squared trends	no	no	no	yes
AB	0.426	0.517	0.961	0.555
R	0.194	0.554	0.163	0.353
CW	0.000	0.795	0.855	0.928
IM-test	0.487	0.464	0.463	0.458
p-values in parentheses				
+ p<0.2, * p<0.1, ** p<0.05, *** p<0.01				

Table 2.8 Auxiliary Regressions for the EAFRD Allocation Mechanism, dependent variable: EAFRD

	Country groups			
Regressors	EU	EU 2004	BVB	BV
GDP per capita (t-1)	2.837	3.899		
	(0.420)	(0.326)		
GDP per capita (t-2)	-2.990	-2.741	-1.412	-1.756
	(0.323)	(0.288)	(0.357)	(0.529)
Pop. growth rate (t-1)		-7.888	-17.79+	-31.72*
		(0.280)	(0.132)	(0.060)
GFI (t-1)	-0.664	-1.092	1.285*	0.442
	(0.531)	(0.357)	(0.084)	(0.493)
CF(t-1)	-0.0162			
	(0.673)			
EAFRD (t-1)	-0.110**	-0.0207	-0.198**	-0.111
	(0.017)	(0.752)	(0.015)	(0.485)
ERDF (t-1)		0.0168		
		(0.629)		
ESF (t-1)	0.0257	0.0157	0.0135	0.0236
	(0.403)	(0.637)	(0.707)	(0.431)
Share of empl.in agr.(t-1)	-7.852	-14.01	11.97	6.059
	(0.498)	(0.331)	(0.292)	(0.614)
Share of empl.in agr.(t-2)	-9.341		-12.25	9.338
	(0.260)		(0.227)	(0.599)
Share of empl.in ind. (t-1)	17.14*	15.48*	30.07**	28.53*
	(0.052)	(0.081)	(0.018)	(0.052)
Share of empl.in ind. (t-2)	1.238			6.821
	(0.906)			(0.684)
Tot. unempl. rate (t-1)	0.0960*	0.0899+	0.166***	0.138**
	(0.079)	(0.101)	(0.004)	(0.044)
Election turnout (t-1)				0.0233
				(0.399)
Left-wing (t-1)	-0.00616	-0.00620+	-0.0141*	-0.00865
	(0.261)	(0.163)	(0.091)	(0.239)
N	173	147	127	105
R^2	0.847	0.865	0.859	0.885
adj. R^2	0.836	0.856	0.851	0.878
Linear trends	yes	yes	yes	yes
Squared trends	yes	yes	yes	yes
AB	0.075	0.017	0.785	0.484
R	0.203	0.105	0.177	0.096
CW	0.026	0.076	0.251	0.326
IM-test	0.485	0.484	0.458	0.454
p-values in parentheses				
+ p<0.2, * p<0.1, ** p<0.05, *** p<0.01				

Table 2.9 Auxiliary Regressions for the ERDF Allocation Mechanism, dependent variable: ERDF

	Country groups			
Regressors	EU	EU 2004	BVB	BV
GDP per capita (t-1)	-4.391**	-3.060***	-3.014+	-3.657
	(0.024)	(0.003)	(0.171)	(0.208)
Pop. growth rate (t-1)	6.774	-7.855	7.628	27.12+
	(0.560)	(0.464)	(0.406)	(0.135)
GFI (t-1)	1.122**	1.632***	0.452	0.777
	(0.032)	(0.002)	(0.565)	(0.509)
EAFRD (t-1)	0.0714*	-0.0272	0.0241	-0.127
	(0.059)	(0.597)	(0.386)	(0.466)
ERDF (t-1)	-0.0127	0.0127	0.0493	-0.121+
	(0.839)	(0.824)	(0.414)	(0.172)
ESF (t-1)	0.106*	0.0256	0.0865*	0.0360
	(0.089)	(0.476)	(0.092)	(0.647)
Share of empl.in agr.(t-1)	-10.23+	-1.083	-2.918	-37.81***
	(0.152)	(0.704)	(0.516)	(0.010)
Share of empl.in ind. (t-1)	3.158	2.888	5.583	3.854
	(0.410)	(0.262)	(0.221)	(0.643)
Election turnout (t-1)	-0.00830	-0.0162+	-0.0178	-0.0321***
	(0.540)	(0.168)	(0.231)	(0.002)
Left-wing (t-1)	0.0142*	0.00840+	0.00676	0.0118+
	(0.085)	(0.156)	(0.545)	(0.184)
N	181	148	129	105
R^2	0.625	0.765	0.702	0.816
adj. R^2	0.600	0.751	0.685	0.807
Linear trends	no	no	no	yes
Squared trends	no	no	no	yes
AB	0.728	0.870	0.595	0.665
R	0.290	0.978	0.795	0.749
CW	0.000	0.994	0.723	0.977
IM-test	0.465	0.461	0.458	0.454
p-values in parentheses				
+ p<0.2, * p<0.1, ** p<0.05, *** p<0.01				

Table 2.10 Auxiliary Regressions for the ESF Allocation Mechanism, dependent variable: ESF

	Country groups			
Regressors	EU	EU 2004	BVB	BV
GDP per capita (t-1)	-4.391**	-3.060***	-3.014+	-3.657
	(0.024)	(0.003)	(0.171)	(0.208)
Pop. growth rate (t-1)	6.774	-7.855	7.628	27.12+
	(0.560)	(0.464)	(0.406)	(0.135)
GFI (t-1)	1.122**	1.632***	0.452	0.777
	(0.032)	(0.002)	(0.565)	(0.509)
EAFRD (t-1)	0.0714*	-0.0272	0.0241	-0.127
	(0.059)	(0.597)	(0.386)	(0.466)
ERDF (t-1)	-0.0127	0.0127	0.0493	-0.121+
	(0.839)	(0.824)	(0.414)	(0.172)
ESF (t-1)	0.106*	0.0256	0.0865*	0.0360
	(0.089)	(0.476)	(0.092)	(0.647)
Share of empl.in agr.(t-1)	-10.23+	-1.083	-2.918	-37.81***
	(0.152)	(0.704)	(0.516)	(0.010)
Share of empl.in ind. (t-1)	3.158	2.888	5.583	3.854
	(0.410)	(0.262)	(0.221)	(0.643)
Election turnout (t-1)	-0.00830	-0.0162+	-0.0178	-0.0321***
	(0.540)	(0.168)	(0.231)	(0.002)
Left-wing (t-1)	0.0142*	0.00840+	0.00676	0.0118+
	(0.085)	(0.156)	(0.545)	(0.184)
N	181	148	129	105
R^2	0.625	0.765	0.702	0.816
adj. R^2	0.600	0.751	0.685	0.807
Linear trends	no	no	no	yes
Squared trends	no	no	no	yes
AB	0.728	0.870	0.595	0.665
R	0.290	0.978	0.795	0.749
CW	0.000	0.994	0.723	0.977
IM-test	0.465	0.461	0.458	0.454
p-values in parentheses				
+ p<0.2, * p<0.1, ** p<0.05, *** p<0.01				

Table 2.11 The Impact of Separate EU Funds and Foreign Aid on GDP per capita, 1995-2018, dependent variable: GDP per Capita, specification with the W_{it-1} vector

	(1)	(2)	(3)	(4)	(5)	(6)
	all	non-EU	EU	EU 2004	BVB	BV
GFI	0.159***	0.0743	0.151***	0.125**	0.208***	0.194*
	(0.000)	(0.107)	(0.001)	(0.002)	(0.000)	(0.022)
GFI (t-1)	-0.0313	0.00832	-0.0507	-0.0888*	-0.0243	-0.0904
	(0.210)	(0.820)	(0.057)	(0.023)	(0.435)	(0.064)
ODA	-0.0000422	0.0214*	0.00135	-0.000607	-0.00215	0.00493
	(0.976)	(0.016)	(0.232)	(0.922)	(0.818)	(0.652)
ODA (t-1)	-0.00107	-0.000646	-0.00128	-0.000843	0.0146	0.0109
	(0.200)	(0.896)	(0.392)	(0.898)	(0.138)	(0.176)
CF	0.000680		0.00191*	0.00235*	0.00492	0.00465
	(0.532)		(0.016)	(0.027)	(0.129)	(0.224)
CF(t-1)	0.00198		0.00250	0.00446*	0.00604	0.00713
	(0.260)		(0.298)	(0.046)	(0.152)	(0.066)
EAFRD	0.00143		0.00161	-0.00191	-0.00156	-0.0103*
	(0.343)		(0.212)	(0.337)	(0.342)	(0.032)
EAFRD (t-1)	0.00142		0.00269	0.00683*	0.00207	0.0124*
	(0.502)		(0.211)	(0.039)	(0.537)	(0.015)
ERDF	-0.00108		-0.000944	-0.00113	-0.000626	-0.00317
	(0.340)		(0.431)	(0.588)	(0.734)	(0.494)
ERDF (t-1)	0.0000830		0.00144	0.000887	0.00571	0.00216
	(0.963)		(0.428)	(0.692)	(0.114)	(0.654)
ESF	-0.000350		-0.0000182	0.00115	-0.000194	0.00193*
	(0.762)		(0.987)	(0.145)	(0.896)	(0.015)
ESF (t-1)	-0.00153*		-0.00121	-0.00349***	-0.00214**	-0.00275*
	(0.044)		(0.160)	(0.000)	(0.002)	(0.037)
Pop. growth rate (t-1)	-0.686	-0.372	-0.447	-0.598	-0.646	-0.479
	(0.114)	(0.547)	(0.201)	(0.185)	(0.292)	(0.571)
Lincom						
GFI + GFI (t-1)	0.127	0.082	0.099	0.036	0.183	0.103
	(0.000)	(0.085)	(0.028)	(0.334)	(0.001)	(0.142)
ODA + ODA (t-1)	-0.001	0.020	0.000	-0.001	0.012	0.015
	(0.434)	(0.010)	(0.962)	(0.881)	(0.437)	(0.372)
CF + CF(t-1)	0.002		0.004	0.006	0.010	0.011
	(0.194)		(0.081)	(0.015)	(0.068)	(0.077)
EAFRD + EAFRD (t-1)	0.002		0.004	0.004	0.000	0.002
	(0.233)		(0.056)	(0.107)	(0.883)	(0.741)
ERDF + ERDF (t-1)	-0.000		0.000	-0.000	0.005	-0.001
	(0.704)		(0.851)	(0.952)	(0.177)	(0.890)
ESF + ESF (t-1)	-0.001		-0.001	-0.002	-0.002	-0.000
	(0.054)		(0.173)	(0.047)	(0.187)	(0.327)
N	358	80	277	215	196	154
R^2	0.993	0.998	0.995	0.996	0.997	0.998
adj. R^2	0.992	0.997	0.993	0.994	0.995	0.996
AB	0.164	0.269	0.989	0.280	0.610	0.474
R	0.686	0.381	0.981	0.609	0.397	0.353
CW	0.282	0.931	0.005	0.210	0.018	0.013
IM-test	0.505	0.447	0.488	0.487	0.466	0.462
p-values in parentheses						
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$						
Note: The variables presented in the table are focused on the most important policy variables for the sake of brevity						

Table 2.12 The Impact of Separate EU Funds and Foreign Aid on GDP per employee, 1995-2018, dependent variable: GDP per employee, specification with the W_{it-1} vector

	(1)	(2)	(3)	(4)	(5)	(6)
	all	non-EU	EU	EU 2004	BVB	BV
GFI	0.0838***	0.0276	0.0784***	0.0622**	0.109***	0.0936*
	(0.000)	(0.092)	(0.001)	(0.003)	(0.000)	(0.018)
GFI (t-1)	-0.0173	0.000365	-0.0244*	-0.0385*	-0.0157	-0.0392
	(0.102)	(0.985)	(0.047)	(0.042)	(0.330)	(0.093)
ODA	0.0000888	0.0107*	0.000933	-0.000659	-0.00119	0.00213
	(0.893)	(0.038)	(0.120)	(0.841)	(0.778)	(0.655)
ODA (t-1)	-0.000563	0.00219*	-0.000724	-0.000825	0.00580	0.00466
	(0.223)	(0.017)	(0.343)	(0.793)	(0.193)	(0.214)
CF	0.000352		0.00101*	0.000957	0.00190	0.00188
	(0.511)		(0.036)	(0.108)	(0.225)	(0.347)
CF(t-1)	0.00111		0.00116	0.00185	0.00252	0.00335
	(0.245)		(0.335)	(0.113)	(0.245)	(0.074)
EAFRD	0.000657		0.000798	-0.000969	-0.000590	-0.00551*
	(0.425)		(0.327)	(0.339)	(0.592)	(0.017)
EAFRD (t-1)	0.000788		0.00126	0.00321	0.00129	0.00534*
	(0.404)		(0.188)	(0.062)	(0.249)	(0.018)
ERDF	-0.000435		-0.000504	-0.000663	-0.000202	-0.00164
	(0.458)		(0.399)	(0.504)	(0.822)	(0.457)
ERDF (t-1)	0.000168		0.000745	0.000517	0.00221	0.00104
	(0.855)		(0.443)	(0.643)	(0.106)	(0.686)
ESF	-0.000105		0.000134	0.000620	-0.0000980	0.000967*
	(0.844)		(0.800)	(0.102)	(0.896)	(0.019)
ESF (t-1)	-0.000890*		-0.000744	-0.00188**	-0.000976*	-0.00124
	(0.011)		(0.101)	(0.002)	(0.036)	(0.055)
Pop. growth rate (t-1)	-0.336	-0.125	-0.217	-0.300	-0.335	-0.344
	(0.143)	(0.731)	(0.204)	(0.177)	(0.299)	(0.431)
Lincom						
GFI + GFI (t-1)	0.066	0.027	0.053	0.023	0.093	0.054
	(0.000)	(0.265)	(0.018)	(0.277)	(0.001)	(0.125)
ODA + ODA (t-1)	-0.000	0.012	0.000	-0.001	0.004	0.006
	(0.501)	(0.018)	(0.773)	(0.767)	(0.521)	(0.395)
CF + CF(t-1)	0.001		0.002	0.002	0.004	0.005
	(0.172)		(0.075)	(0.063)	(0.148)	(0.131)
EAFRD + EAFRD (t-1)	0.001		0.002	0.002	0.000	-0.000
	(0.217)		(0.068)	(0.178)	(0.495)	(0.948)
ERDF + ERDF (t-1)	-0.000		0.000	-0.000	0.002	-0.000
	(0.845)		(0.865)	(0.940)	(0.188)	(0.868)
ESF + ESF (t-1)	-0.000		-0.000	-0.001	-0.001	-0.000
	(0.029)		(0.258)	(0.086)	(0.190)	(0.508)
N	358	80	277	215	196	154
R^2	0.993	0.998	0.995	0.996	0.997	0.998
adj. R^2	0.992	0.997	0.993	0.994	0.995	0.996
AB	0.062	0.493	0.885	0.368	0.936	0.432
R	0.722	0.633	0.192	0.587	0.646	0.788
CW	0.377	0.794	0.017	0.183	0.013	0.004
IM-test	N/A	0.447	0.488	0.487	0.486	0.462
p-values in parentheses						
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$						
Note: The variables presented in the table are focused on the most important policy variables for the sake of brevity						

Table 2.13 The Impact of Separate EU Funds and Foreign Aid on GDP per employee, 1995-2018, dependent variable: GDP per employee, multi-output distance function, with output-input interactions, specification with the W_{it-1} vector

	(1)	(2)	(3)	(4)	(5)	(6)
	all	non-EU	EU	EU 2004	BVB	BV
GFI	0.0663	0.00638	0.130	0.201	0.00350	-0.0579
	(0.360)	(0.964)	(0.158)	(0.098)	(0.980)	(0.720)
GFI (t-1)	-0.0126	-0.00598	-0.0146	-0.0313*	0.00166	-0.0350
	(0.307)	(0.763)	(0.281)	(0.029)	(0.933)	(0.135)
ODA	-0.00403	-0.0370	-0.00469	-0.00613	-0.00360	-0.0157
	(0.342)	(0.410)	(0.256)	(0.207)	(0.726)	(0.067)
ODA (t-1)	-0.000645	0.00304	-0.000987	-0.000295	0.00684	0.00340
	(0.196)	(0.175)	(0.112)	(0.931)	(0.161)	(0.365)
CF	0.00468		0.00903	0.00577	0.0107	0.00125
	(0.177)		(0.055)	(0.448)	(0.134)	(0.513)
CF(t-1)	0.00131		0.00123	0.00125	0.00190	0.0274
	(0.150)		(0.204)	(0.277)	(0.334)	(0.097)
EAFRD	0.00133		0.00741	0.00788	-0.00874	-0.00256
	(0.629)		(0.106)	(0.370)	(0.531)	(0.932)
EAFRD (t-1)	0.000993		0.00181	0.00223	0.000394	0.00401
	(0.312)		(0.102)	(0.188)	(0.755)	(0.110)
ERDF	0.00832		0.00568	-0.0111	-0.000106	-0.0369
	(0.297)		(0.511)	(0.405)	(0.921)	(0.337)
ERDF (t-1)	0.000300		0.000891	0.000940	0.0201	0.00189
	(0.795)		(0.473)	(0.436)	(0.185)	(0.513)
ESF	-0.00489		-0.00139	0.0133	0.00378	0.0439
	(0.553)		(0.876)	(0.198)	(0.501)	(0.239)
ESF (t-1)	-0.000776*		-0.000842	-0.00217**	-0.000841	-0.00141
	(0.043)		(0.129)	(0.002)	(0.051)	(0.064)
Pop. growth rate (t-1)	-0.305	-0.0849	-0.155	-0.524	-0.326	-0.570
	(0.170)	(0.848)	(0.408)	(0.156)	(0.237)	(0.189)
(r-x)*GFI	-0.00421	-0.00293	0.0137	0.0338	-0.0272	-0.0374
	(0.826)	(0.952)	(0.552)	(0.226)	(0.488)	(0.384)
(r-x)*ODA	-0.00105	-0.0158	-0.00149	-0.00178	-0.00134	-0.00392
	(0.343)	(0.308)	(0.197)	(0.193)	(0.522)	(0.083)
(r-x)*CF	0.00104		0.00180	0.00116	0.00251	
	(0.203)		(0.087)	(0.497)	(0.152)	
(r-x)*EAFRD	0.000256		0.00182	0.00217	-0.00165	0.000919
	(0.738)		(0.113)	(0.284)	(0.651)	(0.899)
(r-x)*ERDF	0.00208		0.00156	-0.00234		-0.00866
	(0.294)		(0.465)	(0.434)		(0.344)
(r-x)*ESF	-0.00111		-0.000303	0.00311	0.000845	0.0107
	(0.570)		(0.888)	(0.219)	(0.542)	(0.249)
(r-x)*Pop. growth rate	0.0294	0.0404	-0.0152	-0.174*	-0.160*	-0.169
	(0.635)	(0.879)	(0.795)	(0.020)	(0.041)	(0.154)
(r-x)*ERDF(t-1)					0.00440	
					(0.301)	
(r-x)*CF(t-1)						0.00604
						(0.142)
Lincom						
GFI + GFI (t-1)	0.053	0.000	0.115	0.169	0.005	-0.092
	(0.400)	(0.998)	(0.161)	(0.148)	(0.967)	(0.603)
ODA + ODA (t-1)	-0.004	-0.033	-0.005	-0.006	0.003	-0.012
	(0.268)	(0.439)	(0.168)	(0.240)	(0.793)	(0.186)
CF + CF(t-1)	0.005		0.010	0.007	0.012	0.028
	(0.124)		(0.052)	(0.355)	(0.151)	(0.100)
EAFRD + EAFRD (t-1)	0.002		0.009	0.010	-0.008	0 .001
	(0.499)		(0.063)	(0.267)	(0.545)	(0.962)
ERDF + ERDF (t-1)	0.008		0.006	-0.010	0.019	-0.034

Continuation of the table 2.13						
	(0.253)		(0.417)	(0.427)	(0.180)	(0.359)
ESF + ESF (t-1)	-0.005		-0.002	0.011	0.002	0.042
	(0.487)		(0.801)	(0.263)	(0.600)	(0.246)
N	358	80	277	215	196	154
R^2	0.998	0.999	0.998	0.999	0.999	0.999
adj. R^2	0.997	0.999	0.998	0.998	0.999	0.999
AB	0.029	0.224	0.771	0.375	0.855	0.432
R	0.076	0.608	0.470	0.708	0.307	0.788
CW	0.366	0.876	0.029	0.055	0.020	0.004
IM-test	N/A	0.447	0.522	0.525	N/A	0.462
p-values in parentheses						
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$						
Note: The variables presented in the table are focused on the most important policy variables for the sake of brevity						

Table 2.14 The Impact of Separate EU Funds and Foreign Aid on GDP per capita, 1995-2018, dependent variable: GDP per Capita, specification without the W_{it-1}vector

	(1)	(2)	(3)	(4)	(5)	(6)
Regressors	all	non-EU	EU	EU 2004	BVB	BV
GFI	0.160***	0.0589	0.169***	0.177***	0.215***	0.234***
	(0.000)	(0.068)	(0.000)	(0.000)	(0.000)	(0.000)
GFI (t-1)	-0.0291	-0.00124	-0.0374	-0.0799*	-0.0178	-0.0809
	(0.248)	(0.974)	(0.148)	(0.011)	(0.534)	(0.064)
ODA	-0.000675	0.0133*	0.00494	0.00338	-0.00748	-0.00429
	(0.666)	(0.032)	(0.359)	(0.502)	(0.418)	(0.588)
ODA (t-1)	0.000843	0.00597	0.000718	-0.00682	0.00572	0.00244
	(0.499)	(0.150)	(0.595)	(0.428)	(0.482)	(0.759)
CF	0.000500		0.00330*	0.00356	0.00591	0.00606*
	(0.624)		(0.041)	(0.072)	(0.057)	(0.037)
CF(t-1)	0.00186		0.00237	0.00528*	0.00517	0.00956*
	(0.253)		(0.240)	(0.013)	(0.217)	(0.031)
EAFRD	0.00117		0.0000929	-0.000922	-0.00590*	-0.0114
	(0.448)		(0.954)	(0.778)	(0.049)	(0.066)
EAFRD (t-1)	0.00169		0.00259	0.00638	0.00132	0.00925
	(0.420)		(0.341)	(0.068)	(0.587)	(0.080)
ERDF	-0.00124		-0.00234	-0.00442	-0.000934	-0.00443
	(0.303)		(0.229)	(0.110)	(0.812)	(0.244)
ERDF (t-1)	-0.00000536		0.00134	0.000883	0.00725	-0.0000975
	(0.998)		(0.410)	(0.679)	(0.053)	(0.981)
ESF	-0.000478		-0.00247	0.000110	-0.00104	0.00180
	(0.692)		(0.219)	(0.942)	(0.646)	(0.266)
ESF (t-1)	-0.00173*		-0.00142	-0.00286**	-0.00214***	-0.00284*
	(0.018)		(0.089)	(0.004)	(0.000)	(0.036)
Pop. growth rate (t-1)	-0.739	-0.537	-0.651	-0.743	-0.842	-0.333
	(0.084)	(0.352)	(0.144)	(0.175)	(0.092)	(0.688)
Lincom						
GFI + GFI (t-1)	0.130	0.057	0.132	0.094	0.192	0.147
	(0.000)	(0.114)	(0.003)	(0.063)	(0.000)	(0.006)
ODA + ODA (t-1)	0.000	0.019	0.000	-0.003	-0.002	0.002
	(0.905)	(0.013)	(0.480)	(0.674)	(0.844)	(0.830)
CF + CF(t-1)	0.002		0.003	0.006	0.011	0.015
	(0.251)		(0.114)	(0.017)	(0.012)	(0.011)
EAFRD + EAFRD (t-1)	0.002		0.003	0.006	-0.001	-0.001
	(0.235)		(0.132)	(0.063)	(0.698)	(0.886)
ERDF + ERDF (t-1)	-0.001		0.000	0.000	0.005	-0.004
	(0.646)		(0.826)	(0.898)	(0.220)	(0.486)
ESF + ESF (t-1)	-0.002		-0.002	-0.002	-0.002	-0.002
	(0.024)		(0.032)	(0.002)	(0.126)	(0.174)
N	360	80	276	216	196	154
R^2	0.993	0.998	0.994	0.995	0.996	0.997
adj. R^2	0.992	0.997	0.992	0.993	0.995	0.996
AB	0.085	0.597	0.208	0.147	0.388	0.259
R	0.630	0.539	0.172	0.168	0.320	0.405
CW	0.183	0.866	0.113	0.936	0.006	0.110
IM-test	0.490	0.447	0.505	0.468	0.486	0.462
p-values in parentheses						
+ p<0.2, * p<0.1, ** p<0.05, *** p<0.01						
Note: The variables presented in the table are focused on the most important policy variables for the sake of brevity						

Table 2.15 The Impact of Separate EU Funds and Foreign Aid on GDP per employee, 1995-2018, dependent variable: GDP per employee, specification without the W_{it-1} vector

	(1)	(2)	(3)	(4)	(5)	(6)
Regressors	all	non-EU	EU	EU 2004	BVB	BV
GFI	0.0836***	0.0341	0.0880***	0.0883***	0.116***	0.117***
	(0.000)	(0.129)	(0.000)	(0.001)	(0.000)	(0.000)
GFI (t-1)	-0.0158	-0.0100	-0.0182	-0.0421**	-0.0100	-0.0429
	(0.145)	(0.629)	(0.182)	(0.009)	(0.504)	(0.052)
ODA	-0.000248	0.0108*	0.00225	0.00145	-0.00234	-0.00232
	(0.740)	(0.018)	(0.419)	(0.569)	(0.611)	(0.561)
ODA (t-1)	0.000411	0.00705**	0.000316	-0.00304	0.00341	0.00133
	(0.479)	(0.003)	(0.679)	(0.416)	(0.425)	(0.761)
CF	0.000249		0.00180*	0.00191	0.00265	0.00309*
	(0.618)		(0.041)	(0.051)	(0.102)	(0.044)
CF(t-1)	0.000975		0.00118	0.00263*	0.00265	0.00520*
	(0.261)		(0.269)	(0.015)	(0.178)	(0.017)
EAFRD	0.000544		-0.000235	-0.000458	-0.00378*	-0.00540*
	(0.511)		(0.806)	(0.784)	(0.010)	(0.046)
EAFRD (t-1)	0.000971		0.00141	0.00328*	0.00119	0.00414
	(0.307)		(0.230)	(0.049)	(0.080)	(0.084)
ERDF	-0.000552		-0.00158	-0.00232	-0.00149	-0.00256
	(0.389)		(0.198)	(0.098)	(0.397)	(0.164)
ERDF (t-1)	0.000109		0.000609	0.000394	0.00253	-0.000260
	(0.904)		(0.429)	(0.719)	(0.109)	(0.908)
ESF	-0.000175		-0.00136	-0.0000119	-0.000874	0.000647
	(0.754)		(0.185)	(0.987)	(0.472)	(0.434)
ESF (t-1)	-0.000992**		-0.000882*	-0.00143**	-0.00122***	-0.00143*
	(0.003)		(0.015)	(0.006)	(0.001)	(0.036)
Pop. growth rate (t-1)	-0.367	-0.560	-0.340	-0.417	-0.427	-0.126
	(0.105)	(0.087)	(0.144)	(0.186)	(0.180)	(0.769)
Lincom						
GFI + GFI (t-1)	0.067	0.025	0.069	0.043	0.101	0.074
	(0.000)	(0.210)	(0.005)	(0.112)	(0.000)	(0.009)
ODA + ODA (t-1)	0.000	0.010	0.000	-0.001	-0.002	0.001
	(0.809)	(0.013)	(0.466)	(0.674)	(0.747)	(0.765)
CF + CF(t-1)	0.001		0.001	0.003	0.005	0.008
	(0.249)		(0.150)	(0.023)	(0.019)	(0.015)
EAFRD + EAFRD (t-1)	0.001		0.001	0.003	-0.000	-0.000
	(0.206)		(0.122)	(0.050)	(0.954)	(0.850)
ERDF + ERDF (t-1)	-0.000		0.000	0.000	0.002	-0.002
	(0.755)		(0.869)	(0.927)	(0.324)	(0.421)
ESF + ESF (t-1)	-0.001		-0.001	-0.001	-0.001	-0.001
	(0.010)		(0.018)	(0.002)	(0.143)	(0.176)
N	360	80	276	216	196	154
R^2	0.998	0.999	0.998	0.998	0.999	0.999
adj. R^2	0.997	0.999	0.997	0.997	0.998	0.998
AB	0.028	0.782	0.119	0.129	0.247	0.197
R	0.729	0.479	0.154	0.446	0.806	0.319
CW	0.262	0.686	0.253	0.731	0.008	0.107
IM-test	0.505	0.447	0.522	0.487	0.486	0.462
p-values in parentheses						
+ p<0.2, * p<0.1, ** p<0.05, *** p<0.01						
Note: The variables presented in the table are focused on the most important policy variables for the sake of brevity						

Table 2.16 The Impact of Separate EU Funds and Foreign Aid on GDP per employee, 1995-2018, dependent variable: GDP per employee, multi-output distance function, with output-input interactions, specification without the W_{it-1}vector

	(1)	(2)	(3)	(4)	(5)	(6)
Regressors	all	non-EU	EU	EU 2004	BVB	BV
GFI	0.0605	0.0990	0.207	0.323*	0.00656	-0.0940
	(0.426)	(0.213)	(0.066)	(0.034)	(0.971)	(0.652)
GFI (t-1)	-0.0112	-0.00518	-0.0155	-0.0374*	0.00629	-0.0378
	(0.366)	(0.819)	(0.356)	(0.010)	(0.785)	(0.119)
ODA	-0.00486	-0.00141	-0.00500	-0.00872	0.00319	-0.0116*
	(0.267)	(0.973)	(0.317)	(0.078)	(0.755)	(0.014)
ODA (t-1)	0.000280	0.00340	-0.000187	-0.000881	0.00204	0.00262
	(0.602)	(0.255)	(0.757)	(0.788)	(0.599)	(0.578)
CF	0.00501		0.00541	0.00467	0.00752	0.00262*
	(0.150)		(0.128)	(0.634)	(0.281)	(0.045)
CF(t-1)	0.00118		0.00117	0.00196	0.00315	0.0190
	(0.174)		(0.157)	(0.083)	(0.113)	(0.266)
EAFRD	0.00215		0.00430	-0.000299	-0.00447	0.00514
	(0.432)		(0.250)	(0.977)	(0.742)	(0.829)
EAFRD (t-1)	0.00117		0.00214	0.00214	-0.000170	0.00397*
	(0.276)		(0.059)	(0.205)	(0.905)	(0.050)
ERDF	0.00792		0.00536	-0.00513	-0.00134	-0.0713*
	(0.305)		(0.535)	(0.716)	(0.242)	(0.043)
ERDF (t-1)	0.000224		0.00105	0.000656	0.0207	0.00120
	(0.842)		(0.370)	(0.633)	(0.157)	(0.603)
ESF	-0.00620		-0.00346	0.0132	0.00837*	0.0673**
	(0.449)		(0.704)	(0.253)	(0.013)	(0.002)
ESF (t-1)	-0.000870*		-0.000871*	-0.00174**	-0.00116***	-0.00172**
	(0.021)		(0.033)	(0.002)	(0.000)	(0.006)
Pop. growth rate (t-1)	-0.337	-0.436	-0.313	-0.686	-0.404	-0.347
	(0.112)	(0.317)	(0.151)	(0.194)	(0.251)	(0.422)
(r-x)*GFI	-0.00581	0.0247	0.0292	0.0579	-0.0275	-0.0539
	(0.773)	(0.316)	(0.279)	(0.092)	(0.558)	(0.348)
(r-x)*ODA	-0.00119	-0.00285	-0.00157	-0.00258	0.00120	-0.00235
	(0.290)	(0.841)	(0.221)	(0.069)	(0.610)	(0.180)
(r-x)*CF	0.00114		0.000983	0.000930	0.00131	
	(0.164)		(0.239)	(0.684)	(0.447)	
(r-x)*EAFRD	0.000482		0.00111	0.000259	-0.000489	0.00272
	(0.526)		(0.247)	(0.913)	(0.888)	(0.665)
(r-x)*ERDF	0.00201		0.00142	-0.00109		-0.0170
	(0.299)		(0.507)	(0.733)		(0.050)
(r-x)*ESF	-0.00143		-0.000705	0.00317	0.00210*	0.0167**
	(0.464)		(0.749)	(0.264)	(0.014)	(0.002)
(r-x)*Pop. growth rate	0.0354	0.0409	-0.000742	-0.209	-0.122	-0.219
	(0.558)	(0.875)	(0.992)	(0.058)	(0.162)	(0.065)
(r-x)*ERDF(t-1)					0.00481	
					(0.242)	
(r-x)*CF(t-1)						0.00349
						(0.424)
Lincom						
GFI + GFI (t-1)	0.049	0.093	0.191	0.285	0.012	-0.131
	(0.470)	(0.337)	(0.054)	(0.047)	(0.936)	(0.518)
ODA + ODA (t-1)	-0.004	0.001	-0.005	-0.009	0.005	-0.008
	(0.282)	(0.961)	(0.278)	(0.088)	(0.616)	(0.139)
CF + CF(t-1)	0.006		0.006	0.006	0.010	0.021
	(0.113)		(0.069)	(0.487)	(0.118)	(0.213)
EAFRD + EAFRD (t-1)	0 .003		0.006	0.001	-0.004	0.009
	(0.345)		(0.124)	(0.856)	(0.714)	(0.698)
ERDF + ERDF (t-1)	0.008		0.006	-0.004	0.019	-0.070

Continuation of the table 2.16						
	(0.260)		(0.438)	(0.739)	(0.181)	(0.042)
ESF + ESF (t-1)	-0.007		-0.004	0.011	0.007	0.065
	(0.383)		(0.632)	(0.306)	(0.028)	(0.002)
N	360	80	280	216	196	154
R^2	0.998	0.999	0.998	0.998	0.999	0.999
adj. R^2	0.997	0.999	0.997	0.998	0.998	0.999
AB	0.011	0.673	0.165	0.150	0.129	0.197
R	0.114	0.528	0.581	0.165	0.171	0.319
CW	0.219	0.681	0.185	0.321	0.038	0.107
IM-test	0.519	0.479	0.539	0.468	0.526	0.462
p-values in parentheses						
+ p<0.2, * p<0.1, ** p<0.05, *** p<0.01						
Note: The variables presented in the table are focused on the most important policy variables for the sake of brevity						

Appendix 2.2

Deriving a long-run solution from Equation (2.3):

In order to derive a long-run solution for Equation (3), we focus for the sake of simplicity only on GDP per employee, employment rate and policy funds:

$$x_{it} = -a_1(r_{it} - x_{it}) + a_2 x_{it-1} + a_3(r_{it-1} - x_{it-1}) + a_{51}F_{it} + a_{52}F_{it}(r_{it} - x_{it}) + \cdots$$

and, as customary for long-run solutions, we take t = t-1, effectively suppressing the time dimension. Hence, we get:

$$x_i = -a_1(r_i - x_i) + a_2 x_i + a_3(r_i - x_i) + a_{51}F_i + a_{52}F_i(r_i - x_i) + \cdots$$

$$(1 - a_1 - a_2 + a_3 + a_{52}F_i)x_i = -(a_1 - a_3 - a_{52}F_i)r_i + a_{51}F_i + \cdots$$

which can be solved either for $x_i$or for r_i:

$$x_i = \frac{-(a_1 - a_3 - a_{52}F_i)}{(1 - a_1 - a_2 + a_3 + a_{52}F_i)} r_i + \frac{a_{51}}{(1 - a_1 - a_2 + a_3 + a_{52}F_i)} F_i + \cdots$$

$$r_i = \frac{-(1 - a_1 - a_2 + a_3 + a_{52}F_i)}{(a_1 - a_3 - a_{52}F_i)} x_i + \frac{a_{51}}{(a_1 - a_3 - a_{52}F_i)} F_i + \cdots$$

These solutions imply that that a higher a_{52} increases the long-run impact of funds on the employment rate and dampens the long-run impact of funds on GDP per employee. But of course, things would go the other way around if a_{52} was negatively signed.

Chapter 3: Public Subsidies, Firm performance and Innovation in Transition Economies

3.1 Introduction

Performance and innovation of the private sector are essential to growth in transition economies. However, underdeveloped capital markets, institutional setups, higher risks compared to developed economies, make firms in transition countries less likely to launch innovation activities (Brown et al., 2012; Erol, 2005). Public authorities and international development agencies have accordingly worked to foster firm growth and innovation in these countries by creating a better business environment. Public subsidies have been an important tool in these development programs.

According to the definition of the OECD, a public subsidy is a transfer provided by governments to firms, formally defined as "current unrequited payments that government units, including non-resident government units, make to enterprises on the basis of the levels of their production activities or the quantities or values of the goods or services which they produce, sell or import".[14]

Governments decide to provide subsidies to firms for several reasons. The economic literature behind Research and Development (R&D) subsidies reveals that innovation projects lead to market failures. The earlier theoretical arguments of R&D subsidies for private innovative activities were constructed by Arrow (1962) and Spence (1984). According to these theories, firms are normally interested to invest in innovation projects which maximize private profits, rather than on the ones which would be socially beneficial but carry uncovered private costs. In order to create incentives for innovative activities and thereby induce economic growth, governments fund firms with R&D subsidies (Almus & Czarnitzki, 2003).

In transition economies, that is in economies changing from a centrally planned economy to a market economy, the general goal of public subsidies may also be to increase

14 Subsidies (2001) OECD Online Glossary of Statistical Terms (Financial statistics), retrieved from: https://stats.oecd.org/glossary/detail.asp?ID=2588.

local production, support SME development and increase export. Despite the importance and monetary magnitude of public subsidies, their impact in transition countries remains relatively unstudied due to a lack of data. This gap in the literature is vouched by the literature reviews of Cerulli (2010), Cin et al. (2017), and Mateut (2018).

In this chapter, we aim to fill this gap by using the results of one of the most recent and unique private sector surveys in transition states from the World Bank Enterprise Survey (WBES).[15] We study the relationship between public subsidies and firm-level productivity and innovation activities in 29 transition and developing economies in CEE and CIS. Our main additions to the existing literature are the joint treatment of firm-level productivity and innovation and the use of panel techniques, including a difference-in-differences framework.

This chapter is structured as follows: in section 2, we present the literature review and highlight the research questions and the novelty of the present study, section 3 introduces the dataset and its main variables, section 4 explains the empirical model. In section 5 we discuss our main results, while section 6 presents some robustness checks and additional evidence. Section 7 concludes.

3.2 Literature review

3.2.1 The literature and its gaps

This literature survey covers studies conducting an impact evaluation of public subsidies on various firm-level innovation inputs (in particular research and development, henceforward R&D) and outputs, and which compare the outcomes of interest between subsidized firms versus unsubsidized firms. First, we cover the main empirical studies conducted in developed countries and then we review in greater detail the studies in developing and transition economies.

This review highlights some main points in the literature. First, the existing literature provides no consistent answer about the effectiveness of public subsidies. Secondly, the literature mainly considers innovation inputs (such as R&D), and not innovation outputs, as the outcome of interest. Third, it clearly emerges from the survey that the impact of public

15 Note that this survey was dubbed BEEPS (Business Environment and Enterprise Survey) until recently: https://www.enterprisesurveys.org/en/survey-datasets.

subsidies on innovation activities and firm performance in Eastern Europe and Central Asia is still a largely unstudied topic.

In a final sub-section, we detail how the analysis of this chapter proceeds in order to fill the gaps unveiled by the literature survey.

3.2.2 The main tenets of the literature

The widespread practice of innovation support schemes through public subsidies for firms has originated a vast empirical literature that assessed the effects of these incentives. A point immediately emerging from the perusal of this literature is that most papers deal with R&D subsidies and how they influenced private R&D expenses rather than innovation output variables (Busom, 2000; David et al., 2000; Zúñiga-Vicente et al.; 2014; Becker, 2015).

Zúñiga-Vicente et al. (2014) summarize the existing literature about the effects of public subsidies on the innovation inputs saying that results are inconclusive and mixed. Becker (2015) adds that although most often larger firms are granted R&D subsidies, it is smaller firms that benefit from the additionality effect of the subsidies since they mostly experience financial constraint to invest in R&D. Also, Becker (2015) observes that earlier works demonstrated public R&D subsidies crowded out private R&D, while more recent works mostly suggested a stimulative impact instead.

Another strand of the literature, which is considerably smaller, focuses on the impact of government subsidies on innovation outputs. According to the review of Li et al. (2021), this literature provides widely divergent results: a stimulative impact (Bronzini & Piselli, 2016; Howell, 2017), a counterproductive effect (Link & Scott, 2013; Shu et al., 2015), an insignificant impact (Klette et al., 2011), and a non-linear effect (Dai & Cheng, 2015; Liu et al., 2019). The differences in impact vary depending on the dependent variable, firm-level characteristics, economic environment, and the type of government subsidies.

Very few works studied how public subsidies aiming to increase investment and innovation impact firm-level performance. Among those, most works show that subsidized firms tend to be less efficient compared to unsubsidized firms. For example, de Jorge & Suárez (2011) analyzed the effect of subsidies on technical efficiency in an unbalanced panel of innovative Spanish firms during the period of 1993-2002, Sissoko (2011) studied the effects on labour productivity in France, and Catozzella & Vivarelli (2016) studied the impact of public funding on innovative productivity using a sample of Italian firm-level data. Bernini & Pellegrini (2011) also assessed the impact of government subsidies on firm behavior and

productivity in South Italy and came to conclusion that susbidized firms experience less productivity growth. According to the authors, the firms try to increase the number of employees in order to gain public subsidies which may negatively affect efficiency in the long term. Apparently, overreliance on subsidies which stabilize income of SMEs may lead to the situation where subsidy recipients loose incentives to maximize profit and to implement better working strategies for doing business.

Yet there are also studies which unveiled a positive influence of public subsidies on firm performance. Cin et al. (2017) conducted research on R&D subsidies effects on Korean manufacturing SME performance (value added productivity) using a large panel dataset. Applying a difference-in-differences methodology, they found positive effects of subsidies both on performance and R&D expenditure. Using a panel dataset of firms, Howell (2017) conducted a quasi-experimental evaluation of R&D subsidies and found out that government subsidies to small size and young start-up companies have significant positive effect on both innovation activity and firm performance in the US.

3.2.3 The impact of public subsidies in developing and transition economies

Most of the studies on the effects of public subsidies are on developed economies, while the studies focusing on developing and transition economies remain relatively few. Therefore, this section covers exhaustively the studies which evaluated the impact of public subsidies in developing and transition countries. We focus in particular on Mateut (2018), who relies on the same data that will be used in our empirical exercise.

Using the three cross-sectional datasets retrieved from the innovative activities survey results about German manufacturing firms during 1995, 1997 and 1999, Almus and Czarnitzki (2003) evaluated the impact of R&D subsidies on innovation activities and private R&D investment in Eastern Germany using a nonparametric matching approach and found a positive effect of about four percentage points on R&D intensity at the firm-level. Özçelik and Taymaz (2008) studied the role of R&D subsidies in a panel of Turkish manufacturing firms during 1992-2001 and concluded that public support serves as an accelerator to private R&D investment with a greater influence on small enterprises. Using various panel datasets, Hall and Maffioli (2008) used quasi-experimental econometric techniques to evaluate the impact of Technology Development funds (TDF) on firm-level private R&D investment, productivity, and innovative activities in Argentina, Brazil, Chile, and Panama. The study reveals that in Latin America, the effectiveness of subsidies depends on the type of incentive, non-financial

constraints, and firm–university interaction. But generally, public subsidies served as a positive incentive for increasing innovation and R&D effort and firm growth, while the effect on productivity was insignificant, possibly because of the short time horizon of the evaluation.

Jin et al. (2018) studied the influence of government subsidies on firm-level R&D investment (R&D intensity) and performance (return on assets) focusing on the role of ownership type. The study uses a panel dataset of Chinese manufacturing companies. Their results show that, while state-owned enterprises attract more subsidies, these subsidies have a larger favourable impact on privately owned firms.

Mateut (2018) studied how public subsidies affected innovation in a cross-section from the WBES in 2009, including 11988 firms in 30 transition states in Eastern Europe and Central Asia. Her empirical model determines innovative activities as a function of subsidies received, the firm's financial strength and R&D effort, plus other control variables. The link between limited innovation and financial constraints in transition countries was already highlighted in a paper by Gorodnichenko & Schnitzer (2013). The vector of control variables comprises variables such as firm's size, age, exporter status, presence of foreign capital, capacity utilization, capital intensity, training activity, location, the importance of domestic and foreign competition. Various estimators (probit, instrumental variables, matching) are applied to the WEBS 2009 data, finding that subsidies are a stronger boost for innovation in the case of financially constrained firms. Furthermore, the role of subsidies in promoting firm innovation is stronger in non-EU countries compared to EU countries, as financial constraints are less cogent for the latter. Summarizing the review of the influence of public subsidies in transition and developing countries, we can report a positive impact of subsidies on innovation and private R&D effort, while there is much less evidence about their impact on productivity.

3.2.4 Filling the gaps

The focus on the literature for emerging and transition economies confirms that, while subsidies seem to have a positive impact on innovation, no consistent answer emerges about their effects on productivity and growth. Furthermore, while there have been a few studies discussing public subsidies' effects on innovation activities and firm performance for transition and emerging economies, Eastern Europe and Central Asia still remain largely unstudied. To our knowledge, only Mateut (2018) deals with these countries. However, there are several features that distinguish the study of this chapter from that of Mateut (2018). In that article,

there is a cross-sectional analysis (for 2009). Besides, Mateut (2018) estimated the impact of public subsidies on innovation indicators only.

The novelty of the present analysis includes the following features. First, we estimate the relationship between public subsidies, firm performance and innovative activities in 29 countries in Eastern Europe and Central Asia using dynamic panel techniques for two waves (2009 and 2013) of the WBES. Thus, we add to the existing literature (in particular to Mateut (2018)), by extending the little empirical evidence available for the group of transition economies and bringing panel techniques to these data. This chapter also contributes to the literature by estimating the impact of public subsidies not only on various (input and output) innovation indicators, but also on firm-level performance measures, using a difference-in-differences framework. Further novelties of our approach are that we consider, in the analysis of public subsidies, the degree of ownership concentration and whether a firm was privatized (being formerly a state-owned enterprise, SOE) versus being private ab initio. Previous literature on transition economies highlighted the importance of considering ownership concentration and structure when studying firm performance (Estrin et al., 2009; Harper, 2002; D'Souza et al., 2017).

3.3 Data and variables

We use the WBES panel dataset for 2729 firms from 29 transition economies in the 2008-2009 and 2012-2013 survey waves, overall. Hence this dataset covers 5458 observations from CEE and CIS countries. This firm-level dataset is collected through standardized surveys from business owners and top managers and is suitable for cross-country and panel analysis. It provides information on a large number of factors for doing business and firm characteristics (ownership concentration, exporter status, etc.). It includes a question on the origins of the establishment, whether it was privatized from a SOE, or was private originally. A more precise application of the survey questions as variables are explained in table 3.1. All the summary statistics for distribution of variables in the dataset are given in tables 3.2-3.4. Around ten percent of firms from our sample are subsidized firms.

Performance measures. Following the example of D'Souza et al. (2017), we use three outcome variables for measuring firm performance: **sales growth**, **employment growth**, and

labour productivity. According to D'Souza et al. (2017), these indicators are useful to describe the firm's long term-perspectives and are calculated as following:

$$Sales\ Growth = [\log sales_{t-1} - \log sales_{t-3}]\ /2 \tag{3.1}$$

$$Employment\ Growth = [\log employees_{t-1} - \log employees_{t-3}]\ /2 \tag{3.2}$$

$$Productivity = [\log sales_{t-1}\ / \log employees_{t-1}] \tag{3.3}$$

Innovation indicators. Innovation is the process of creating new products and of absorbing firm-relevant knowledge from the outside (Escribano et al., 2009; Tsai, 2009). There are several innovation output indicators that we can derive from the WBES survey questions. **New product** is a binary variable equal to one if the firm introduced new product or new service over the last three years. **New Process** is a binary variable for significant improvement of a process during the last three years. **Knowledge acquisition** is a dummy variable equal to one if the firm spent on acquisition of external knowledge over last three years and zero otherwise. These innovation indicators align with the definition of innovation in the Business enterprise sector explained in Frascati manual (OECD, 2015) and earlier manuals on innovation activities. Also these indicators have been used in previous literature by Gorodnichenko & Schnitzer (2013), Gorodnichenko et al. (2010) and Mateut (2018). Table 3.2 provides summary statistics (number of observations, mean, standard deviation, minimum and maximum values) for all the variables used in the empirical model. Table 3.3 presents the share of firms in each country which introduced new product, new production process and received subsidies.

Table 3.4 provides additional statistics on firm innovation grouping samples by subsidy receipt, survey wave and EU membership. The EU countries are Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, Slovenia which joined the EU in 2004, as well as Bulgaria and Romania which joined the EU in 2007. The non-EU countries are Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Croatia, FYR Macedonia, Georgia, Kazakhstan, Kyrgyz Republic, Kosovo, Moldova, Montenegro, Mongolia, Russia, Serbia, Tajikistan, Ukraine and Uzbekistan. According to this table 3.4, we can see that subsidized firms engaged more innovation activities. Also, firms received slightly a greater number of subsidies during the second wave, but innovation rate in terms of New Product is twice higher during the first wave, or 2008-2009 compared to the following wave.

Around twenty percent of firms from the EU member countries received subsidies, while only six percent of firms were subsidized in non-EU countries. However, the difference in innovation activities between EU and non-EU firms is not as drastic. Also, as described in the table 3.4, New Process and Knowledge acquisition were included in the survey only starting from 2012. Therefore, our analysis for these variables is limited to a cross-sectional setup.

Subsidies. The "subsidy" dummy variable is our treatment variable. The WBES database has a question about whether the firm received subsidies from national, regional or local authorities and European Union over the last three years. Around ten per cent of the sampled firms receive a subsidy. The questionnaire does not differentiate the type, source, or purpose of subsidies received. Instead, the survey provides if the firm received any sort of subsidy from government or other any institution. This is a drawback of our study, on the other hand, this maybe a strength of this study as well, allowing to solve the issue of spillover effects of various simultaneous incentives. The control group consists of firms which did not receive any type of subsidy within the last three years.

Privatized status. There is vast literature which demonstrates the importance of ownership structure in transition countries in firm performance. Governments in transition economies implemented a large privatization reform in 1990-2000s with a belief that private ownership will lead to better performance of SOEs (Estrin et al., 2009). The evidence shows that privatized firms from former SOE experience lower financial, institutional and legal obstacles compared to firms which were originally private. Also the studies show that although privatized firms have less obstacles, they are less efficient in terms of sales and employment growth (D'Souza et al., 2017). Jin et al. (2018) in a study of Chinese companies, conclude that SOE have a higher take-up rate of subsidies, but private firms perform better as a result of public funding. Therefore, it is important to include privatization status as a part of explanatory variables.

Firm size is given as a number of employees. As we mentioned in the literature review section, firm size plays an important role in firm growth and evaluating the effect of subsidies. For example, González et al. (2005) and Howell (2017) highlighted that subsidies have greater impact on smaller firms, Mateut (2018) concluded that firm size has a significant impact on the effectiveness of subsidies.

Firm age is included since older firm have higher experience in the field and therefore maybe more innovative and perform better. Beck et al. (2006) found out that older enterprises

face less growth constraints. But also, it is possible that older firms are rigid in terms of management and hence less innovative. Although the general belief is that younger firms bear higher risks and constraints in doing business due to information asymmetry and limited access to finance, Evans (1987) concluded that younger firms grow faster compared to older ones. Srhoj et al. (2019) in a study about effectiveness of business development grants in Croatian firms, concluded that grant schemes were highly successful for survival of the youngest firms in the market. That is why we include firm age as a control variable. The average firm in our sample is 16 years old and the oldest firm operated for 184 years (table 3.2)

According to Gorodnichenko et al. (2010), linkage to foreign organizations and participation in foreign markets creates competitive pressure to innovate and improve among firms in emerging economies. Therefore, we added the *exporter* status of the firm as a control variable. The previous literature also demonstrated that ownership concentration determines firm performance. For example, Hingorani et al. (1997) and Pohl, Claessens, & Djankov (1999) concluded that the more concentrated the firm's ownership is after privatization, the more profitable it becomes. Hence we follow the example of Harper (2002) and D'Souza et al. (2017) and include the percent of the largest shareholder in our empirical framework as *ownership concentration*. Further controls such as the presence of foreign capital, capacity utilization, capital intensity, training activity, location, importance of domestic and foreign competition were also attempted in preliminary estimates, but never turned out to be significant.

Finally, one of the main determinants of firm-level innovation is the level of financial constraints experienced by firms. The link between limited innovation and perceived financial constraints in transition countries was confirmed by recent papers of Gorodnichenko & Schnitzer (2013) and Mateut (2018). We follow the example of these papers and include a perceived *financial constraint* variable into our model. It is a dummy variable equal to one if a firm perceives that financial constraints are its greatest obstacle to growth.

Besides all mentioned factors, firm growth tends to be significantly restricted or induced by *macroeconomic environment* (Beck et al., 2005). We control for country level macroeconomic factors named using GDP at constant prices, GDP growth rate, GDP per capita. As it is demonstrated in the table 3.2, the average logarithm of GDP is 24.42, average GDP growth is around eight percent and average GDP per capita is almost 7000 USD. We follow D'Souza et al. (2017) and include a country-level financial development indicator given as *Priv* which is the share of loans from domestic banks to the private sector in GDP. In our sample,

the mean *Priv* is around 50 percent. We downloaded *Priv* and other macroeconomic indicators from the World Bank's database of development indicators.16

Although the countries in the dataset have similar historical background, they were exposed to different institutional development since independence, so we also need to consider *institutional differences*. We derived governance indicators from World Bank's WGI dataset, specifically the measures of corruption control, accountability and rule of law. The indicators vary from -2,5 to 2,5, indicating weak and strong governance respectively. Since the described variables could be correlated among each other, we capture macroeconomic and institutional dynamics using principal component analysis technique. We control for industry, survey wave period and country effects in our estimations. The WBES provides industry classification of the manufacturing firms according to ISIC Revision 3.1 and includes enterprises from around 30 sectors.

3.4 Empirical framework

The research question that we intend to answer in our analysis are the following:

1. How does receiving public subsidies may influence firms' performance and innovation? We extend upon the study of Mateut (2018) by considering the impact of subsidies on various indicators of firm performance besides innovation, and by adopting a panel data approach.
2. What types of firms receive incentives in terms of subsidies in transition economies? Does being a privatized firm from a former SOE increase the probability of receiving a subsidy?
3. How do such key characteristics as firm size, age, export status, ownership structure, ownership concentration, and financial situation affect firm-level performance and innovation?

Purely static analysis of public subsidies has drawbacks in terms of unobserved factors and selection bias which may bring to wrong interpretations of causality in the subsidy-performance, subsidy-innovation relationships. A randomized control trial would solve the

16 International Monetary Fund, International Financial Statistics and data files, and World Bank and OECD GDP estimates.

issue of selection bias, but we are not aware of such programs in this field. Hence, in order to assess the impact of the public subsidies, we apply a counterfactual analysis framework. The counterfactual analysis captures the statistical difference in an outcome variable comparing its value for the units that have been exposed to a policy and the value for the same variable in the non-existing (thus counterfactual) case where the same units were not exposed to the policy. The value of the difference is considered to be a "counterfactual" measure of the treatment effect. The main issues related to counterfactual analysis are omitted variables and selection bias. The omission of variables happens due to factors other than the studied policy which affect the outcome variable. The selection bias occurs when the treated firms systematically differ from control firms, and therefore the counterfactual analysis may provide biased results, underestimating or overestimating the policy effects.

Blundell and Dias (2000) describe four methods of quantitative assessment based on non-experimental statistical design: difference-in-differences, matching methods, selection estimators, and structural simulation models. The choice of the research framework depends on two criteria: the type of policy intervention, and how the selection was done, and control unit, and whether the sample dataset is cross-sectional or longitudinal. The panel dataset based on the WBES provides information on firms for the two waves and allows the measurement of a pre-treatment and a post-treatment period. This suggests the adoption of a difference-in-differences framework.

We define the firms which did not receive any subsidy within the last three years as a control group and adopt four different specifications for the treated firms: A *classic* difference-in-differences framework, where treated firms are subsidized only in the second wave, an *inverse* difference-in-differences framework where treated firms are subsidized only in the first wave, and two static frameworks. In the first one, treated firms are subsidized *either* in the first or the second wave and in the second one, treated firms are subsidized in *both* waves.

Besides adopting these different definitions of treated firms, we allow for the selection bias through balancing methods (this is our preferred strategy), and through a selection on observables approach that explicitly models the probability of being subsidized. This two-stage method is adopted as a robustness check. However, through the first-stage regressions of this method, we will gather novel knowledge about the factors driving the subsidization of a firm.

When adopting balancing methods, we control for systematic differences among subsidized and non-subsidized firm characteristics using entropy balancing. Entropy balancing

is used to incorporate covariate balance in the weight function. According to Hainmueller (2012), entropy balancing supersedes techniques such as propensity score matching and nearest matching in several ways. The technique is less demanding to run and allows to weight based on the larger set of covariates while retaining more information which is beneficial for the following steps of the analysis. Table 3.5 demonstrates how treatment and control group is balanced as a result of "ebalance" function in Stata.

We deal with the omitted variables bias through an empirical specification which is a mix of a firm growth model in transition economies and a framework derived from public subsidy effectiveness literature to consider the role of state aid in productivity and innovation. Following the empirical approach of D'Souza et al. (2017) and Mateut (2018) firm-specific, industry-specific, geographical, macroeconomic, institutional, and financial factors to identify firm-level productivity, growth, and innovation. As a result, we have the following dynamic panel data specification:

$$\begin{aligned} Y_{ikt} = \ & \alpha + \beta_1 S_{ikt} + \beta_2 privatized_{ikt} + \beta_3 size_{ikt} + \beta_4 age_{ikt} \\ & + \beta_5 ownership_{ikt} \\ & + \beta_6 exporter_{ikt} + \beta_8 FC_{ikt} + \beta_7 Institutions_{kt} + \beta_8 Macro_{kt} \\ & + \beta_9 X_{ikt} + u_{ijkt} \end{aligned} \tag{3.4}$$

where theY_{ikt} is firm performance and innovation indicators such as logarithm of sales per employee, sales growth, employment growth, the introduction of new product or service, introduction of an improved production process, acquisition of external knowledge during the last three years. The subscripts $i, k,$ and t represent firm, country and year, respectively. S_{ikt} is a zero-one variable that equals one if a firm was subsidized during the last three years. $Privatized_{ikt}$ is a dummy variable equal to 1 if a firm is privatized from the former SOE and zero otherwise. $Exporter_{ikt}$ is also a dummy variable which equals to 1 if the firm is an exporter. $Ownership_{ikt}$ is the percent share of the largest owner. FC_{ikt} is another dummy variable that is equal to one if the firm chooses "access to finance" as the greatest obstacle to firm growth. $Institutions_{kt}$ is a predicted variable based on principal components of variables on the quality of governance and financial market structure: Priv, Corruption Control, Rule of Law, and Accountability. $Macro$ also consists of principal component measures of the logarithms of GDP and GDP per capita, GDP growth rate for 2009 and 2013. Finally, X_{ikt} includes a set of dummy variables to control for unobserved country, industry and time period-specific variations in performance and innovation.

3.5 Main results

Our empirical analysis estimates the effects of subsidies received on three performance measures (sales per employee, sales growth, employment growth) and three innovative activities (introduction of significantly improved process and a new product, acquisition of external knowledge) of the surveyed firms. The results for estimations applying pooled OLS and fixed-effects models are given in tables 3.6-3.27.

The estimation results for pooled OLS are given in tables 3.6-3.27. These output tables consist of four columns. Column one named as "classic" is an estimation result for firms that were subsidized only on the second wave, column two named as "inverse" is output for the firms treated only on the first wave, column three named as "either" describes results for the firms treated either in the first or the second wave, and column four labeled "both" shows results for firms treated in both waves.

For the two innovation indicators, specifically for New Process and Knowledge acquisition, we can provide only cross-sectional estimations as these variables were included in the survey only starting from 2012-2013. We present results for fixed-effects models starting from table 3.20 to 3.27. These tables consist of three columns: "classic", "inverse" and "either" with the same definition as it was explained previously.

Subsidy The estimations show that subsidies did not have any impact on productivity and sales growth. However, we can observe that there is a minor positive effect of public subsidies on employment growth. The positive impact is mostly explained by employment growth in the firms from non-EU transition economies. The receipt of subsidies led to approximately a nine percent increase in firm-level employment growth in non-EU countries and a two to four percent increase in all transition countries.

The impact of public subsidies on almost all innovation activities, on the other hand, was positive and significant. There is strong evidence that government aid has a larger effect on innovation in non-EU countries. Also, this impact was stronger for firms subsidized during the first wave (2008-2009). Subsidies had smaller impacts on New Process and Knowledge acquisition compared to New Product.

Firm size has mixed effects on different indicators. As is expected, it has a negative impact on productivity, and positive impact on employment growth, and there was no observed impact on sales growth. When it comes to innovation, larger firms are slightly more innovative

compared to smaller firms, one percent increase in firm size led to around three percent increase in the probability of undertaking innovative activities in terms of introducing a new product, around six percent probability of introducing a new process in non-EU countries and seven percent of acquiring new knowledge in non-EU countries. Overall, the evidence shows that the firm size has a larger influence on innovation in non-EU countries compared to EU countries.

Age demonstrates different effects. According to pooled OLS model, older firms tend to have lower employment growth compared to younger ones both in EU and non-EU countries. Also, older firms have a higher probability of introducing more new production processes.

Privatized versus de novo private firms. As it can be noticed from all the output tables, privatized firms mostly exhibit lower efficiency as well as lower innovation. Privatization had a noticeable negative effect on employment growth, both in EU and non-EU countries, but for the sample of EU countries, it was larger. Privatized firms in EU transition countries have less probability to introduce new production process.

Ownership concentration had no significant impact on any of the dependent variables except for productivity. Firms in non-EU countries with higher ownership concentration tend to be slightly less productive. *Export status* had a negative impact on firm performance measures, specifically on productivity and employment growth. However, exporting firms in the EU transition countries are significantly more innovative both in introducing new products and new process. *Financial constraint* had a minor negative effect in terms of productivity and sales growth in non-EU countries.

3.6 Robustness check: a two-stage analysis

In this section, we aim to address the same questions but with a different approach. We conduct an alternative two-stage analysis with predicted selection probability to check the robustness of the results of our main framework. This technique is applied less often in counterfactual analysis than matching methods in firm-level policy impact evaluation, but there are some papers, like Busom (2000) and Cin et al. (2017), where it is employed. Moreover, this exercise is instrumental in understanding how public subsidies were distributed to a given set of firms, adding novel knowledge to the literature. We start by discussing the approach and later will demonstrate that the results are in line with the difference-in-differences estimation.

Instead of entropy balancing, the first stage of our alternative empirical framework constructs an auxiliary regression and estimates the selection probability for each firm through a binary fixed-effects logistic regression model. We specify the treatment dummy variable "subsidy" as a function of our standard list of covariates:

$$P(S_i = 1) = F(privatized, size, age, ownership, exporter, institutions, FC, macro, wave, country, industry) \quad (3.5)$$

Tables 3.28 and 3.29 report marginal effects calculated at mean values and robust standard errors. Since we have no information on types of incentives, this output helps us to understand which firms receive subsidies in all countries of the sample, as well as understand subsidy distribution differences in the EU and non-EU transition economies. The marginal effects suggest that, on average, large and exporting firms are more likely to be subsidized. Among all the coefficients, exporter status has the greatest effect on treatment. Besides, the countries with higher quality institutions are also likely to provide more incentives in terms of subsidies. The fact that larger enterprises get subsidized more often in developing economies was earlier stated in the study of Acemoglu et al. (2018).

We also can observe that privatized firms in EU countries have a higher propensity to be treated. This aligns with political connectedness literature in transition economies, for example, Boubakri et al. (2008) concluded that most of the privatized firms were owned by a current or a former politician, D'Souza et al. (2017) explained that former SOE and newly privatized firms bear less financial and legal obstacles. Finally, Tao et al.(2017) concluded that politically connected, and especially SOEs receive more subsidies.

In the second stage, we apply the same exercise, additionally including the selection probability in the linear regression of the outcome variable:

$$\begin{aligned} Y_{ikt} = {} & \alpha + \beta_1 S_{ikt} + \beta_2 privatized_{ikt} + \beta_3 size_{ikt} + \beta_4 age_{ikt} \\ & + \beta_5 ownership_{ikt} \\ & + \beta_6 exporter_{ikt} + \beta_8 FC_{ikt} + \beta_7 Institutions_{kt} + \beta_8 Macro_{kt} \\ & + \beta_9 X_{ikt} + \beta_{10} plogit_{ikt} + u_{ijkt} \end{aligned} \quad (3.6)$$

where the set of variables is identical to the specification equation (3.5) and $plogit_{ikt}$is the selection score of a firm to receive a subsidy.

Tables 3.30-3.43 present the effect of receiving public subsidies on performance and innovative activities. As it was demonstrated in the previous difference-in-differences analysis, among performance indicators, subsidies have a positive impact on firm-level employment growth, mostly in non-EU countries. This robustness check also reaffirms the important positive role of public subsidies in inducing firm innovation. The size of the impact is larger on the introduction of a new product, compared to the introduction of a significantly improved production process. However, while difference-in-differences estimation did not capture any effect of subsidies on knowledge acquisition, the two-stage analysis shows a positive impact of subsidy receipt on innovation indicators in non-EU countries. Overall, from our analysis, it is evident that state financial aid has a more significant contribution to private sector development when it comes to non-EU countries.

3.7 Concluding Remarks

This chapter estimates the impact of public subsidies on firm performance and innovation behavior in 29 transition economies using a panel dataset from the 2009 and 2013 survey waves of the WBES. Total annual sales and number of employees are used as main inputs for the three performance indicators: labor productivity, employment growth, and sales growth. The innovation indicators are presented in terms of the introduction of new products/services and new production/supply methods in the studied firms, as well as knowledge acquisition. We extend upon the existing literature, in this still largely unstudied field, by considering the impact of subsidies on various indicators of firm performance besides innovation output and input indicators, and by adopting a panel data approach.

We applied a difference-in-differences framework to estimate the impact of public subsidies on performance and innovation. We defined the firms which did not receive any subsidy as a control group and adopted four different specifications for the treated firms. In our baseline approach, we first weighted observations from the treatment and control group through entropy balancing and then conducted pooled OLS estimations as well as fixed effects model. The evidence suggests that public subsidies have a positive impact on innovation and employment growth. On the other hand, we did not observe a significant correlation between public subsidies and productivity and sales growth. A robustness check carried out through a two-stage selection-on-estimators analysis validated the above results. After controlling for institutional, financial, macroeconomic, industry, and firm-level differences, both approaches

demonstrated a similar pattern for the public subsidy effects on firms' behavior. When computing, in the selection-on-estimators analysis, the probability of receiving subsidies, we also found interesting patterns in the subsidy distribution across firms. Larger and exporting firms are subsidized more often. Besides, in line with the existing literature, privatized firms in EU transition economies have a higher probability of being selected to receive public subsidies but are less efficient in using these subsidies for growth and innovation.

We also paid attention to the effects of size, age, ownership concentration, exporter status, perceived financial constraints among firms, as well as for macroeconomic and institutional differences of the countries. Our findings suggest that larger and older firms more often undertake the development of new products. Higher ownership concentration is associated to lower productivity in non-EU economies. Exporter firms in the EU transition economies are more innovative.

Our empirical study emphasizes the importance of public subsidies for promoting innovation. We suggest the following policy recommendations. Since we observed that privatized firms have a higher tendency to receive subsidies and less to be efficient, in order to increase the effectiveness of subsidies distribution, it is necessary to provide a more just, transparent selection process where the rent-seeking behavior of involved authorities is minimized. The assessment of the applicant to the government or regional subsidies should prioritize originally privately-owned companies compared to privatized firms as such firms provide more innovative output.

There are several limits to this study. In particular, due to the lack of data, we cannot define and differentiate the type of subsidy that is received by a firm. Moreover, our study is not able to assess the effects of the amount of subsidies received.

Appendix 3.1

Table 3.1 Description of variables of interest and the according survey questions

Variable	Survey question	Source
Performance indicators		
Productivity	Log of total annual sales per employee	WBES
Sales growth	The average of the difference of log sales in year (t−1) and log sales in year (t−3)	WBES
Employment growth	The average of the difference of log [employees (t−1)] and log [employees (t−3)]	WBES
Innovation indicators		
New process	Dummy variable equal to 1 if a firm introduced new/significantly improved process during last 3 years and 0 otherwise	WBES
New product	Dummy variable equal to 1 if a firm introduced new product or service during last 3 years and 0 otherwise	WBES
Knowledge acquisition	Dummy variable equal to 1 if a firm spent on acquisition of external knowledge over last 3 years and 0 otherwise	WBES
Independent variables		
Subsidy	Dummy variable equal to 1 if a firm has received any subsidies from the national, regional or local governments of European Union sources over the 3 years and 0 otherwise	WBES
Privatized	Dummy variable equal to 1 if a firm was established as a result of privatization of a formerly state-owned firm and 0 if firm was private from time of start	WBES
Firm size	num. permanent, full-time employees at end of last fiscal year	WBES
Firm age	num. of years since the firm was established	WBES
Foreign	% Owned by Private Foreign Individuals, Companies or organizations	WBES
Exporter	Dummy variable equal to 1 if firm had any direct export sales during the previous fiscal year	WBES
Ownership	Percentage of firm owned by the largest owner(s)	WBES
Financial constraint (FC)	Dummy variable equal to 1 if firm chose access to finance as the greatest obstacle to growth among other 14 types of obstacles	WBES
Country level control variables		
Priv	Private credit by deposit money banks to GDP, calculated using the following deflation method: {(0.5) ∗ [Ft/P_et + Ft − 1/P_ et − 1]}/[GDPt/P_at] where F is credit to the private sector, P_e is end-of period CPI, and P_a is average annual CPI	IFS
Corruption control	Country-level corruption estimate of Worldwide Governance Indicators (WGI) and ranges from approximately −2.5 (weak) to 2.5 (strong) governance performance.	WGI
Accountability	Country-level estimate of WGI for perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. It ranges from approximately −2.5 (weak) to 2.5 (strong) governance performance.	WGI
Rule of law	Country-level estimate of Worldwide Governance Indicators (WGI) for rule of society, contract enforcement, property rights, the police, the courts, crime and violence. It ranges from approximately −2.5 (weak) to 2.5 (strong) governance performance.	WGI
GDP constant	Logarithm of GDP in constant 2010 U.S. dollars.	WDI
GDP growth	GDP growth rate	WDI
GDP per capita	Logarithm of GDP per capita in constant 2010 U.S. dollars	WDI

Sources of data: WBES = World Bank Enterprise Survey (WBES); WDI = World Development Indicators, WorldBank; WGI = Worldwide Governance Indicators, WorldBank; IFS = International Financial Statistics.

Table 3.2 Summary statistics

Panel A. Firm performance variables						
Variable	N	Mean	Median	SD	Min	Max
Productivity	4419	5.794	5.167	2.607	1.82	28.646
Employment growth	4717	0.035	0	0.232	-1.907	2.9
Sales growth	3739	0.186	0.122	0.533	-2.685	8.369
Panel B. Firm level controls						
Age	5112	15.927	14	13.241	0	184
Privatized	5177	0.202	0	0.402	0	1
Ownership	4927	80.468	100	26.032	1	100
Exporter	5141	0.211	0	0.408	0	1
Panel C. Financial strength variable						
Financial constraint	4502	0.169	0	0.375	0	1
Panel D. Country level controls						
Priv	3050	49.988	48.521	18.208	12.654	102.538
Corruption Control	3328	-0.44	-0.7	0.684	-1.31	1.19
Accountability	3328	-0.159	0	0.852	-2.1	1.12
Rule of Law	3328	-0.289	-0.37	0.682	-1.33	1.2
GDP Constant	3328	24.422	24.415	1.515	22.295	28.134
GDP Growth	3328	0.782	1.755	6.154	-14.434	11.649
GDP per Capita	3328	6968.929	4562.708	5887.25	707.125	23299.21

Table 3.3 Summary of firm-level innovative activity indicators and subsidies by country

Country	New Product	New Process	Knowledge acquisition	Subsidy
Albania	0.251	0.083	0.159	0.031
Belarus	0.5	0.333	0.114	0.037
Georgia	0.241	0.162	0.074	0.049
Tajikistan	0.428	0.314	0.087	0.014
Ukraine	0.407	0.162	0.179	0.013
Uzbekistan	0.137	0.022	0	0.040
Russia	0.593	0.391	0.152	0.059
Poland	0.515	0.529	0.154	0.290
Romania	0.495	0.340	0.183	0.112
Serbia	0.525	0.208	0.169	0.105
Kazakhstan	0.271	0.121	0.151	0.067
Moldova	0.411	0.284	0.342	0.079
Bosnia and Herz.	0.467	0.339	0.421	0.170
Azerbaijan	0.304	0.072	0	0.066
North Macedonia	0.488	0.264	0.304	0.054
Armenia	0.451	0.065	0.145	0.024
Kyrgyz Republic	0.476	0.232	0.366	0.079
Mongolia	0.492	0.389	0.365	0.092
Estonia	0.473	0.180	0.375	0.233
Kosovo	0.772	0.727	0.4	0.048
Czech Republic	0.638	0.555	0.285	0.444
Hungary	0.294	0.242	0.119	0.238
Latvia	0.425	0.225	0.098	0.164
Lithuania	0.477	0.182	0.277	0.269
Slovak Republic	0.458	0.166	0.285	0.042
Slovenia	0.674	0.168	0.2	0.269
Bulgaria	0.321	0.143	0.044	0.071
Croatia	0.473	0.270	0.391	0.311
Montenegro	0.351	0.148	0.181	0.038
Total	0.425	0.221	0.211	0.095

Table 3.4 Firm-level innovation by subsidy receipt, wave and the EU membership

Firm innovation by subsidy receipt					
		New Product	New Process	Knowledge acq.	
No subsidy	Mean	0.407	0.203	0.192	
	Std. Dev.	0.491	0.403	0.394	
	Obs	4628	2294	1169	
Subsidy	Mean	0.587	0.372	0.332	
	Std.Dev.	0.493	0.484	0.472	
	Obs	480	261	190	
Firm innovation and subsidy receipt by survey waves					
		NewProduct	New Process	Knowledge acq.	Subsidy
Wave 1	Mean	0.572			0.085
	Std. Dev.	0.494			0.279
	Obs	2580	0	0	2555
(2008-2009)					
Wave 2	Mean	0.277	0.221	0.211	0.102
	Std. Dev.	0.447	0.415	0.408	0.303
	Obs	2583	2577	1367	2569
(2012-2013)					
Firm innovation and subsidy receipt by EU membership					
		NewProduct	New Process	Knowledge acq.	Subsidy
Non - EU	Mean	0.411	0.216	0.224	0.064
	Std. Dev.	0.492	0.411	0.417	0 .245
	Obs	4007	2001	1004	3972
EU	Mean	0.470	0.236	0.176	0.196
	Std. Dev.	0.499	0.425	0.382	0.397
	Obs	1156	576	363	1152

The EU countries are Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, Slovenia which joined the EU in 2004, as well as Bulgaria and Romania which joined the EU in 2007. The non-EU countries are Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Croatia, FYR Macedonia, Georgia, Kazakhstan, Kyrgyz Republic, Kosovo, Moldova, Montenegro, Mongolia, Russia, Serbia, Tajikistan, Ukraine and Uzbekistan.

Table 3.5 Distribution of the sample dataset before and after entropy balancing

Before weighting						
	Treat			Control		
	mean	variance	skewness	mean	variance	skewness
privatized	0.271	0.199	1.030	0.212	0.167	1.406
lfirm_size	3.945	2.185	0.432	3.359	1.831	0.505
lage	2.562	0.402	0.059	2.402	0.457	-0.042
ownership	76.700	846.400	-1.038	75.620	986.100	-1.074
exporter	0.435	0.247	0.264	0.196	0.157	1.536
After weighting						
	Treat			Control		
	mean	variance	skewness	mean	variance	skewness
privatized	0.271	0.199	1.030	0.271	0.198	1.030
lfirm_size	3.945	2.185	0.432	3.945	2.075	0.130
lage	2.562	0.402	0.059	2.562	0.507	0.261
ownership	76.700	846.400	-1.038	76.700	839.300	-0.990
exporter	0.435	0.247	0.264	0.435	0.246	0.264

Table 3.6 Difference-in-differences estimation for productivity, pooled OLS

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	-0.0221	-0.0304	-0.142*	-0.0617
	(0.855)	(0.758)	(0.046)	(0.540)
Privatized	-0.0950	-0.143	-0.168+	-0.0373
	(0.414)	(0.224)	(0.085)	(0.789)
Size	-1.113***	-1.003***	-1.012***	-1.115***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.0928	0.0992	0.0606	0.0601
	(0.184)	(0.225)	(0.291)	(0.404)
Ownership	-0.00111	0.000853	0.000937	0.00198
	(0.544)	(0.591)	(0.485)	(0.244)
Exporter	-0.193	-0.166	-0.120	-0.0858
	(0.116)	(0.169)	(0.222)	(0.481)
FC	-0.0361	0.301	0.0233	-0.0261
	(0.784)	(0.125)	(0.872)	(0.846)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	2059	2014	2303	1924
R^2	0.705	0.701	0.730	0.769

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.7 Diff.-in-diff/s estimation for productivity in the EU, pooled OLS

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.101	-0.0940	0.0184	0.0593
	(0.458)	(0.497)	(0.793)	(0.622)
Privatized	0.130	0.0587	0.0272	0.108
	(0.440)	(0.752)	(0.835)	(0.644)
Size	-0.984***	-0.999***	-0.983***	-1.125***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.00441	0.0949	0.0286	0.121
	(0.948)	(0.442)	(0.675)	(0.182)
Ownership	0.00126	0.00231	0.00230	0.00367+
	(0.536)	(0.141)	(0.147)	(0.078)
Exporter	0.0320	0.0981	0.0251	0.127
	(0.768)	(0.478)	(0.823)	(0.353)
FC	0.0749	0.244+	0.0703	-0.00466
	(0.609)	(0.059)	(0.518)	(0.975)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	441	436	553	418
R^2	0.795	0.792	0.828	0.831

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.8 Diff-in-diff/s estimation for productivity in non-EU countries, pooled OLS

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	-0.193	-0.0850	-0.297*	-0.151
	(0.312)	(0.643)	(0.017)	(0.334)
Privatized	-0.298*	-0.289	-0.405**	-0.231+
	(0.050)	(0.127)	(0.003)	(0.095)
Size	-1.270***	-1.040***	-1.107***	-1.193***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.186	-0.0277	0.0578	-0.0391
	(0.117)	(0.820)	(0.508)	(0.651)
Ownership	-0.00678*	-0.00425	-0.00510*	-0.00623*
	(0.039)	(0.126)	(0.030)	(0.026)
Exporter	-0.269	-0.376+	-0.186	-0.155
	(0.161)	(0.070)	(0.264)	(0.355)
FC	-0.201	0.471	0.175	0.0339
	(0.367)	(0.310)	(0.549)	(0.895)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	1618	1578	1750	1506
R^2	0.671	0.677	0.682	0.759

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.9 Diff-in-diff/s estimation for employment growth, pooled OLS

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0130	0.00846	0.0269*	0.0251
	(0.578)	(0.693)	(0.042)	(0.127)
Privatized	-0.0751***	-0.0603**	-0.0484*	-0.0419
	(0.000)	(0.002)	(0.037)	(0.262)
Size	0.0246***	0.0277***	0.0165**	0.0232**
	(0.000)	(0.000)	(0.003)	(0.002)
Age	-0.0233+	-0.0450***	-0.0338*	-0.0322
	(0.075)	(0.000)	(0.023)	(0.114)
Ownership	0.000188	-0.000292	0.000173	0.00000102
	(0.512)	(0.201)	(0.515)	(0.997)
Exporter	-0.0257	0.00695	-0.0224	-0.0410+
	(0.207)	(0.696)	(0.250)	(0.052)
FC	-0.00245	0.0292	0.00205	0.00233
	(0.907)	(0.199)	(0.921)	(0.921)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	2192	2151	2439	2056
R^2	0.157	0.241	0.198	0.265

p-values in parentheses, + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.10 Diff-in-diff/s estimation for employment growth in the EU, pooled OLS

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	-0.0468	-0.0192	0.0198	0.0359
	(0.256)	(0.467)	(0.317)	(0.146)
Privatized	-0.0538	-0.0132	-0.0288	0.0326
	(0.113)	(0.658)	(0.357)	(0.553)
Size	0.0139	0.0161+	0.00538	0.0256**
	(0.130)	(0.086)	(0.514)	(0.007)
Age	-0.0148	-0.0413*	-0.0536*	-0.0619*
	(0.518)	(0.048)	(0.017)	(0.015)
Ownership	0.000495	-0.000170	-0.0000992	-0.000391
	(0.339)	(0.595)	(0.793)	(0.416)
Exporter	-0.0154	0.0328	-0.00624	-0.0499
	(0.641)	(0.257)	(0.838)	(0.107)
FC	-0.0110	0.0498+	0.0463*	0.0585*
	(0.695)	(0.054)	(0.032)	(0.030)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	442	440	554	418
R^2	0.197	0.339	0.208	0.317

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.11 Diff-in-diff/s estimation for employment growth in non-EU, pooled OLS

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0658**	0.0430	0.0361*	0.0201
	(0.003)	(0.285)	(0.016)	(0.254)
Privatized	-0.0790***	-0.0707**	-0.0814***	-0.111***
	(0.000)	(0.002)	(0.000)	(0.000)
Size	0.0294***	0.0337***	0.0260***	0.0241**
	(0.000)	(0.000)	(0.000)	(0.001)
Age	-0.0292*	-0.0410**	-0.0162	0.0184
	(0.029)	(0.004)	(0.248)	(0.368)
Ownership	-0.000200	-0.000240	0.0000420	-0.0000714
	(0.425)	(0.430)	(0.863)	(0.830)
Exporter	-0.0429+	0.00111	-0.0422+	-0.0108
	(0.066)	(0.970)	(0.063)	(0.672)
FC	-0.00360	0.0308	-0.00283	0.00452
	(0.908)	(0.477)	(0.932)	(0.900)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	1750	1711	1885	1638
R^2	0.220	0.229	0.288	0.361

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.12 Diff-in-diff/s estimation for sales growth, pooled OLS

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	-0.00320	0.0372	0.0146	-0.0246
	(0.964)	(0.599)	(0.737)	(0.709)
Privatized	-0.102*	-0.0532	-0.0194	-0.118*
	(0.023)	(0.590)	(0.664)	(0.015)
Size	0.0210	0.0214	0.00709	-0.00677
	(0.143)	(0.170)	(0.555)	(0.652)
Age	-0.00398	-0.0524	-0.0115	-0.00137
	(0.891)	(0.100)	(0.683)	(0.971)
Ownership	-0.00117	-0.000828	0.0000211	-0.000594
	(0.122)	(0.335)	(0.980)	(0.614)
Exporter	0.0872+	0.0505	0.0482	-0.00422
	(0.071)	(0.290)	(0.216)	(0.910)
FC	-0.0706+	-0.0250	-0.0918+	-0.106+
	(0.060)	(0.710)	(0.069)	(0.082)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	1795	1751	2011	1663
R^2	0.260	0.275	0.198	0.250

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.13 Diff-in-diff/s estimation for sales growth in the EU, pooled OLS

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	-0.0897	0.0186	-0.0241	-0.0231
	(0.387)	(0.844)	(0.630)	(0.677)
Privatized	-0.0129	0.0556	-0.00472	-0.213**
	(0.849)	(0.755)	(0.944)	(0.006)
Size	0.0177	-0.0134	-0.0113	-0.0204
	(0.378)	(0.599)	(0.483)	(0.258)
Age	-0.0399	-0.0702+	-0.00688	-0.00289
	(0.327)	(0.059)	(0.824)	(0.922)
Ownership	-0.000438	0.000120	-0.000253	-0.000977
	(0.689)	(0.927)	(0.784)	(0.289)
Exporter	0.142*	0.120*	0.140**	0.0882
	(0.040)	(0.039)	(0.005)	(0.173)
FC	-0.0241	-0.137	-0.0836	-0.0448
	(0.688)	(0.183)	(0.207)	(0.403)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	407	402	506	381
R^2	0.425	0.362	0.223	0.459

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.14 Diff-in-diff/s estimation for sales growth in non-EU countries, pooled OLS

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.115*	-0.0463	0.0844	0.148
	(0.029)	(0.569)	(0.145)	(0.132)
Privatized	-0.0302	0.0343	-0.0169	0.0695
	(0.582)	(0.581)	(0.767)	(0.338)
Size	0.0210	0.0240	0.0131	-0.00790
	(0.272)	(0.210)	(0.444)	(0.704)
Age	-0.0147	-0.0324	0.0133	0.00585
	(0.726)	(0.384)	(0.758)	(0.914)
Ownership	-0.00105	0.000284	0.00122	0.00146
	(0.103)	(0.690)	(0.153)	(0.165)
Exporter	0.0216	0.0352	0.0218	-0.00927
	(0.675)	(0.554)	(0.682)	(0.867)
FC	-0.118*	0.0473	-0.160+	-0.196*
	(0.015)	(0.520)	(0.057)	(0.034)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	1388	1349	1505	1282
R^2	0.260	0.399	0.335	0.390

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.15 Diff-in-diff/s estimations for New Product Innovation, pooled logistic regression

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0746	0.219***	0.127***	0.142*
	(0.239)	(0.001)	(0.001)	(0.010)
Privatized	-0.121*	0.0149	-0.130**	-0.215***
	(0.031)	(0.821)	(0.009)	(0.001)
Size	0.0229	0.0133	0.0348*	0.0422
	(0.163)	(0.393)	(0.034)	(0.101)
Age	0.0136	0.00943	0.0308	0.0525
	(0.695)	(0.791)	(0.402)	(0.231)
Ownership	-0.0000785	0.000215	-0.000143	-0.00128
	(0.909)	(0.769)	(0.829)	(0.172)
Exporter	0.0668	0.0765	0.118*	0.0554
	(0.193)	(0.126)	(0.011)	(0.416)
FC	-0.0385	-0.0571	-0.0540	-0.0287
	(0.537)	(0.382)	(0.329)	(0.676)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	2339	2297	2606	2197

The table reports marginal effects calculated at the mean and robust and standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.16 Diff-in-diff/s estimations for New Product Innovation in EU, pooled logistic regression

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0353	0.432***	0.134*	0.211***
	(0.739)	(0.000)	(0.011)	(0.000)
Privatized	-0.162	-0.178+	-0.176*	-0.452***
	(0.121)	(0.058)	(0.033)	(0.000)
Size	0.0216	0.0170	0.0423*	0.0493+
	(0.350)	(0.429)	(0.035)	(0.050)
Age	0.000581	0.00768	0.0617	0.0982+
	(0.991)	(0.883)	(0.237)	(0.078)
Ownership	0.0000646	-0.00151	-0.000851	-0.00308**
	(0.947)	(0.117)	(0.339)	(0.004)
Exporter	-0.00880	-0.137*	0.0336	-0.0574
	(0.905)	(0.038)	(0.603)	(0.430)
FC	-0.0498	-0.103	-0.0357	0.0130
	(0.588)	(0.286)	(0.645)	(0.888)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	473	473	593	449

The table reports marginal effects calculated at the mean and robust and standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.17 Diff-in-diff/s estimations for New Product Innovation in non-EU, pooled logistic regression

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0648	0.110	0.128**	0.229***
	(0.330)	(0.139)	(0.002)	(0.000)
Privatized	-0.141*	0.0373	-0.0863	-0.0440
	(0.016)	(0.579)	(0.134)	(0.485)
Size	0.0315+	0.0168	0.0276+	0.00330
	(0.070)	(0.288)	(0.077)	(0.872)
Age	0.0471	0.0434	-0.0135	0.00894
	(0.177)	(0.289)	(0.720)	(0.834)
Ownership	-0.000664	0.000676	-0.0000271	-0.000430
	(0.410)	(0.451)	(0.971)	(0.565)
Exporter	0.122*	0.238***	0.147*	0.154*
	(0.045)	(0.000)	(0.011)	(0.023)
FC	-0.00623	-0.0422	-0.0659	-0.106
	(0.912)	(0.468)	(0.303)	(0.106)
Macro controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
N	1863	1824	2010	1745

The table reports marginal effects calculated at the mean and robust and standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.18 Diff-in-diff/s estimations for New Process Innovation, logistic regression analysis for cross-sectional data

	All countries	EU member	Non-EU countries
Subsidy	0.0938+	0.130	0.120*
	(0.060)	(0.130)	(0.040)
Privatized	-0.270***	-0.276*	-0.184+
	(0.000)	(0.014)	(0.078)
Size	0.0364+	0.00173	0.0690**
	(0.088)	(0.962)	(0.002)
Age	0.119*	0.137	0.0585
	(0.024)	(0.134)	(0.411)
Ownership	0.000432	0.000236	0.000961
	(0.608)	(0.835)	(0.288)
Exporter	0.100+	0.178	0.0312
	(0.086)	(0.106)	(0.692)
FC	0.0651	0.201+	-0.0200
	(0.372)	(0.083)	(0.819)
Macro controls	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes
N	1277	265	988

The table reports marginal effects calculated at the mean and robust and standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.19 Diff-in-diff/s estimations for Knowledge acquisition innovation, logistic regression analysis for cross-sectional data

	All countries	EU member	Non-EU countries
Subsidy	-0.0161	-0.00789	0.0897
	(0.797)	(0.930)	(0.203)
Privatized	0.0977	0.0624	0.136
	(0.247)	(0.606)	(0.129)
Size	0.0540*	-0.0307	0.0745***
	(0.024)	(0.432)	(0.001)
Age	-0.0202	-0.0217	-0.0274
	(0.707)	(0.778)	(0.684)
Ownership	0.000350	-0.00355*	0.00311*
	(0.778)	(0.025)	(0.015)
Exporter	-0.108	0.114	-0.0982
	(0.169)	(0.472)	(0.246)
FC	0.127	0.264*	0.0192
	(0.167)	(0.037)	(0.864)
Macro controls	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes
N	726	161	543

The table reports marginal effects calculated at the mean and robust standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.20 Difference-in-differences estimation for productivity, fixed effects

	(1) classic	(2) inverse	(3) either
Subsidy	-0.282	-0.0104	-0.114
	(0.124)	(0.954)	(0.270)
Privatized	0.0726	-0.394	-0.246
	(0.763)	(0.321)	(0.273)
Size	-1.751***	-1.709***	-1.588***
	(0.000)	(0.000)	(0.000)
Age	0.0628	0.231	0.0433
	(0.489)	(0.266)	(0.592)
Ownership	-0.00676*	-0.00317	-0.00190
	(0.025)	(0.322)	(0.457)
Exporter	-0.486*	0.00888	-0.0645
	(0.025)	(0.968)	(0.767)
FC	-0.158	0.386	0.0599
	(0.341)	(0.116)	(0.709)
Macro controls	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes
N	2059	2014	2303
R^2	0.666	0.664	0.628
adj. R^2	0.665	0.663	0.627

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.21 Difference-in-differences estimation for productivity in the EU versus non-EU countries, fixed effects

	EU member countries			Non-EU countries		
	(1) classic	(2) inverse	(3) either	(1) classic	(2) inverse	(3) either
Subsidy	-0.0477	0.113	0.0434	-0.395	-0.130	-0.273
	(0.659)	(0.446)	(0.486)	(0.205)	(0.753)	(0.239)
Privatized	-0.160	0.469	-0.0317	0.00661	-0.487	-0.351
	(0.185)	(0.141)	(0.625)	(0.986)	(0.254)	(0.338)
Size	-1.004***	-1.560***	-1.136***	-1.914***	-1.732***	-1.751***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.0871+	0.0639	0.0377	0.352	0.377	-0.0349
	(0.093)	(0.603)	(0.319)	(0.102)	(0.311)	(0.821)
Ownership	-0.00207	-0.000473	0.00218	-0.0114*	-0.00476	-0.00573
	(0.188)	(0.740)	(0.408)	(0.020)	(0.456)	(0.112)
Exporter	-0.135	0.0486	-0.159	-0.674+	-0.0217	0.0723
	(0.284)	(0.700)	(0.185)	(0.068)	(0.947)	(0.819)
FC	-0.157	-0.0217	-0.00726	-0.492+	0.724	0.108
	(0.131)	(0.868)	(0.936)	(0.092)	(0.204)	(0.733)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes	Yes	Yes
N	441	436	553	1618	1578	1750
R^2	0.620	0.566	0.610	0.719	0.693	0.678
adj. R^2	0.610	0.555	0.602	0.718	0.691	0.676

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.22 Difference-in-differences estimation for employment growth, fixed effects

	(1) classic	(2) inverse	(3) either
Subsidy	-0.0162	0.0610+	0.0244
	(0.736)	(0.085)	(0.355)
Privatized	-0.122**	-0.110+	-0.172***
	(0.003)	(0.058)	(0.000)
Size	0.0641**	0.0260	0.0430*
	(0.002)	(0.118)	(0.027)
Age	-0.00788	-0.0154	0.0199
	(0.791)	(0.604)	(0.510)
Ownership	-0.000120	-0.000378	-0.000195
	(0.840)	(0.540)	(0.714)
Exporter	-0.0664+	-0.0267	-0.0681+
	(0.066)	(0.605)	(0.064)
FC	0.0332	0.0210	0.00332
	(0.380)	(0.489)	(0.924)
Macro controls	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes
N	2192	2151	2439
R^2	0.171	0.231	0.212
adj. R^2	0.167	0.227	0.209

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.23 Difference-in-differences estimation for employment growth in the EU versus non-EU countries, fixed effects

	EU member countries			Non-EU countries		
	(1) classic	(2) inverse	(3) either	(1) classic	(2) inverse	(3) either
Subsidy	-0.0784	0.102**	-0.0152	0.0916*	0.0816	0.0909**
	(0.241)	(0.010)	(0.681)	(0.029)	(0.173)	(0.009)
Privatized	-0.265	-0.440**	-0.335***	-0.0566	-0.0659	-0.106*
	(0.113)	(0.002)	(0.000)	(0.155)	(0.190)	(0.020)
Size	0.174*	0.0535	0.171**	0.0399**	0.0203	0.0139
	(0.034)	(0.301)	(0.003)	(0.001)	(0.241)	(0.409)
Age	0.0273	0.0105	-0.00202	-0.0281	-0.0369	0.0312
	(0.544)	(0.856)	(0.967)	(0.272)	(0.312)	(0.295)
Ownership	-0.000393	-0.000323	-0.000178	0.000508	0.000250	0.0000190
	(0.765)	(0.761)	(0.847)	(0.326)	(0.701)	(0.973)
Exporter	-0.0509	-0.122	-0.0758+	-0.0643+	0.00927	-0.0807
	(0.519)	(0.160)	(0.081)	(0.095)	(0.883)	(0.131)
FC	0.0281	0.0255	0.0388	-0.00204	0.0150	-0.0615
	(0.620)	(0.539)	(0.380)	(0.963)	(0.759)	(0.208)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes	Yes	Yes
N	442	440	554	1750	1711	1885
R^2	0.318	0.350	0.293	0.162	0.254	0.252
adj. R^2	0.300	0.333	0.279	0.157	0.249	0.248

p-values in parentheses

Table 3.24 Difference-in-differences estimation for sales growth, fixed effects

	(1) classic	(2) inverse	(3) either
Subsidy	-0.108	0.0234	-0.0363
	(0.194)	(0.689)	(0.403)
Privatized	-0.165*	-0.0172	-0.114*
	(0.031)	(0.822)	(0.013)
Size	-0.0226	-0.0381	-0.0205
	(0.523)	(0.191)	(0.454)
Age	0.0899*	0.115*	0.0835**
	(0.021)	(0.040)	(0.006)
Ownership	-0.000955	-0.000153	0.00132
	(0.449)	(0.881)	(0.149)
Exporter	0.0707	-0.0529	0.0357
	(0.481)	(0.304)	(0.487)
FC	-0.00946	0.121+	-0.00930
	(0.885)	(0.078)	(0.881)
Macro controls	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes
N	1795	1751	2011
R^2	0.192	0.199	0.172
adj. R^2	0.187	0.194	0.167

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.25 Difference-in-differences estimation for sales growth in the EU versus non-EU countries, fixed effects

	EU member countries			Non-EU countries		
	(1) classic	(2) inverse	(3) either	(1) classic	(2) inverse	(3) either
Subsidy	-0.215	-0.0321	-0.0804	-0.0216	0.0768	0.0440
	(0.167)	(0.674)	(0.177)	(0.829)	(0.296)	(0.427)
Privatized	-0.0198	0.0387	-0.155	-0.0571	0.0242	-0.0736
	(0.910)	(0.817)	(0.142)	(0.527)	(0.737)	(0.254)
Size	-0.0818	-0.0597	-0.121	0.0199	0.0147	0.000172
	(0.523)	(0.540)	(0.323)	(0.551)	(0.500)	(0.995)
Age	0.167**	0.124	0.141**	-0.0116	-0.0136	0.0393
	(0.002)	(0.296)	(0.004)	(0.886)	(0.796)	(0.525)
Ownership	-0.00246	-0.00126	0.0000449	0.000306	0.00104	0.00213
	(0.219)	(0.526)	(0.976)	(0.803)	(0.289)	(0.112)
Exporter	0.279+	0.00599	0.0523	-0.102	-0.0442	-0.0205
	(0.052)	(0.942)	(0.666)	(0.349)	(0.448)	(0.730)
FC	-0.0320	0.186	-0.0368	0.0111	0.160*	-0.0250
	(0.786)	(0.151)	(0.754)	(0.892)	(0.022)	(0.722)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes	Yes	Yes
N	407	402	506	1388	1349	1505
R^2	0.326	0.273	0.221	0.199	0.262	0.165
adj. R^2	0.307	0.253	0.204	0.192	0.256	0.159

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.26 Difference-in-differences estimation for New Product Innovation, fixed effects

	(1) classic	(2) inverse	(3) either
Subsidy	0.121	0.514	0.0488+
	(0.119)	(0.103)	(0.059)
Privatized	0.0808	0.135	0.0320
	(0.265)	(0.194)	(0.169)
Size	-0.0354	-0.0514	0.00372
	(0.249)	(0.138)	(0.732)
Age	-0.0373	-0.0124	-0.0153
	(0.355)	(0.828)	(0.210)
Ownership	0.000311	-0.000405	0.000315
	(0.747)	(0.607)	(0.225)
Exporter	0.0787	0.0978	0.0227
	(0.324)	(0.277)	(0.277)
FC	-0.0390	-0.0925	-0.0223
	(0.504)	(0.127)	(0.217)
Macro controls	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes
N	974	970	1080

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.27 Difference-in-differences estimation for New Product Innovation in the EU versus non-EU countries, fixed effects

	EU member countries			Non-EU countries		
	(1) classic	(2) inverse	(3) either	(1) classic	(2) inverse	(3) either
Subsidy	-3.64e-09	0.00416	-0.000998	0.134	0.411**	0.0450
	(0.934)	(0.905)	(0.754)	(0.239)	(0.002)	(0.289)
Privatized	8.43e-10	0.000262	0.0179	0.0582	0.127+	0.0459
	(0.934)	(0.905)	(0.782)	(0.401)	(0.070)	(0.310)
Size	-1.15e-09	-0.000392	-0.00903	-0.00530	-0.0275	0.0110
	(0.936)	(0.912)	(0.774)	(0.738)	(0.246)	(0.415)
Age	1.21e-10	0.0000722	-0.000820	-0.0255	-0.0394	-0.0286
	(0.929)	(0.901)	(0.822)	(0.573)	(0.360)	(0.218)
Ownership	-1.63e-11	-0.00000532	-0.0000551	0.000226	0.000367	0.000202
	(0.935)	(0.908)	(0.791)	(0.693)	(0.743)	(0.542)
Exporter	-4.52e-10	-0.000198	-0.000322	0.00391	0.0949	-0.0132
	(0.935)	(0.913)	(0.903)	(0.930)	(0.257)	(0.503)
FC	-1.04e-09	-0.000399	-0.00303	-0.0312	-0.000526	-0.0363
	(0.935)	(0.911)	(0.793)	(0.453)	(0.993)	(0.257)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes	Yes	Yes
N	192	190	230	782	780	850
R2						

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.28 The first stage: auxiliary regressions to estimate selection probability to receive public subsidies

	(1)	(2)	(3)
Privatized	0.174	0.191	0.213
	(0.314)	(0.274)	(0.237)
Size	0.252***	0.246***	0.244***
	(0.000)	(0.000)	(0.000)
Age	0.00944	-0.0768	-0.107
	(0.933)	(0.514)	(0.368)
Ownership	0.00258	0.000465	0.000632
	(0.245)	(0.838)	(0.783)
Exporter	0.637***	0.757***	0.574***
	(0.000)	(0.000)	(0.001)
FC	-0.176	-0.122	-0.152
	(0.348)	(0.516)	(0.426)
Macro controls	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes
Industry dummies	Yes	No	Yes
Country dummies	No	Yes	Yes
N	2612	2623	2612

The table reports marginal effects calculated at the mean and robust standard errors clustered at country level.

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.29 The first stage: auxiliary regression to estimate selection probability to receive public subsidies in EU versus non-EU countries

	EU member countries			Non-EU countries		
	(1)	(2)	(3)	(1)	(2)	(3)
Privatized	0.690*	0.778**	0.675*	-0.125	-0.148	-0.0696
	(0.030)	(0.009)	(0.036)	(0.570)	(0.509)	(0.763)
Size	0.341***	0.286**	0.329**	0.254***	0.217**	0.233***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Age	-0.270	-0.263	-0.225	0.0803	0.0501	-0.0149
	(0.198)	(0.184)	(0.299)	(0.584)	(0.742)	(0.922)
Ownership	0.00191	0.000810	0.00196	0.00178	-0.00111	-0.000803
	(0.642)	(0.834)	(0.638)	(0.524)	(0.697)	(0.781)
Exporter	0.534+	0.927***	0.574+	0.526*	0.610**	0.511*
	(0.056)	(0.000)	(0.053)	(0.013)	(0.003)	(0.024)
FC	-1.117**	-0.703+	-1.084**	0.136	0.177	0.220
	(0.005)	(0.062)	(0.007)	(0.529)	(0.416)	(0.324)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	No	Yes	Yes	No	Yes
Country dummies	No	Yes	Yes	No	Yes	Yes
N	582	598	582	2006	2025	2006

The table reports marginal effects calculated at the mean and robust standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.30 Second stage: Impact of public subsidies on productivity

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	-0.0116	0.121	-0.0377	0.0301
	(0.921)	(0.337)	(0.589)	(0.794)
Privatized	-0.0463	-0.0594	-0.0875	-0.0416
	(0.502)	(0.403)	(0.160)	(0.555)
Size	-1.396***	-1.382***	-1.371***	-1.416***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.0365	0.0207	0.0480	0.00212
	(0.502)	(0.714)	(0.335)	(0.970)
Ownership	0.000250	0.000469	0.000485	0.000279
	(0.807)	(0.630)	(0.607)	(0.777)
Exporter	-0.0245	-0.0230	-0.0721	-0.0258
	(0.795)	(0.817)	(0.405)	(0.794)
FC	-0.0530	-0.0109	-0.0290	-0.0377
	(0.507)	(0.899)	(0.713)	(0.651)
plogit	0.420	0.571	1.252	0.867
	(0.670)	(0.558)	(0.112)	(0.341)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	2050	2005	2294	1915
R^2	0.686	0.685	0.686	0.690
adj. R^2	0.677	0.677	0.679	0.681

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.31 Second stage: Impact of public subsidies on productivity in the EU

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	-0.156	0.173	0.0413	0.0206
	(0.477)	(0.415)	(0.699)	(0.916)
Privatized	-0.210	-0.165	-0.294	-0.158
	(0.416)	(0.545)	(0.148)	(0.542)
Size	-1.643***	-1.654***	-1.539***	-1.700***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.310*	0.311*	0.284*	0.319*
	(0.029)	(0.032)	(0.022)	(0.031)
Ownership	0.00592*	0.00378	0.00409*	0.00459*
	(0.014)	(0.108)	(0.037)	(0.048)
Exporter	-0.297+	-0.161	-0.235	-0.263
	(0.078)	(0.365)	(0.111)	(0.192)
FC	0.698*	0.561*	0.577*	0.668*
	(0.014)	(0.049)	(0.023)	(0.021)
plogit	5.480***	4.384**	4.236***	5.687***
	(0.000)	(0.004)	(0.001)	(0.000)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	428	426	539	407
R^2	0.707	0.703	0.710	0.706
adj. R^2	0.679	0.673	0.688	0.676

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.32 Second stage: Impact of public subsidies on productivity in non-EU countries

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0126	0.0273	-0.0652	-0.148
	(0.933)	(0.877)	(0.505)	(0.361)
Privatized	-0.134+	-0.133+	-0.147*	-0.119
	(0.075)	(0.074)	(0.038)	(0.113)
Size	-1.353***	-1.327***	-1.332***	-1.356***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.0205	-0.00873	0.0203	-0.0213
	(0.735)	(0.887)	(0.722)	(0.735)
Ownership	-0.00155	-0.00104	-0.00127	-0.00141
	(0.222)	(0.381)	(0.289)	(0.246)
Exporter	0.0531	0.0425	0.0619	0.0488
	(0.608)	(0.706)	(0.547)	(0.663)
FC	-0.0718	-0.00774	-0.0397	-0.0497
	(0.424)	(0.941)	(0.676)	(0.597)
plogit	-1.676	-1.735	-1.483	-1.374
	(0.229)	(0.215)	(0.255)	(0.289)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	1604	1561	1733	1492
R^2	0.693	0.692	0.688	0.699
adj. R^2	0.683	0.683	0.680	0.690

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.33 Second stage: Impact of public subsidies on employment growth

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0428*	0.0192	0.0331**	0.0315
	(0.012)	(0.441)	(0.008)	(0.107)
Privatized	-0.0864***	-0.0811***	-0.0789***	-0.0829***
	(0.000)	(0.000)	(0.000)	(0.000)
Size	0.0406***	0.0409***	0.0409***	0.0408***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.0536***	-0.0584***	-0.0565***	-0.0552***
	(0.000)	(0.000)	(0.000)	(0.000)
Ownership	0.0000392	-0.0000299	0.0000522	-0.0000244
	(0.836)	(0.876)	(0.767)	(0.902)
Exporter	0.00756	0.0172	0.0137	0.0117
	(0.619)	(0.284)	(0.338)	(0.472)
FC	-0.0164	-0.00806	-0.0128	-0.0146
	(0.211)	(0.553)	(0.307)	(0.284)
plogit	-0.0630	-0.133	-0.159+	-0.121
	(0.573)	(0.236)	(0.096)	(0.301)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	2181	2140	2428	2045
R^2	0.155	0.159	0.155	0.159
adj. R^2	0.134	0.136	0.135	0.136

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.34 Second stage: Impact of public subsidies on employment growth in the EU

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	-0.00773	-0.0296	0.0113	0.0530+
	(0.858)	(0.308)	(0.592)	(0.089)
Privatized	-0.0339	-0.00876	-0.00813	0.0139
	(0.254)	(0.742)	(0.782)	(0.696)
Size	0.0432***	0.0468***	0.0419***	0.0512***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.0466*	-0.0568**	-0.0597**	-0.0634**
	(0.017)	(0.002)	(0.001)	(0.002)
Ownership	0.0000637	-0.0000357	0.0000690	-0.0000402
	(0.855)	(0.914)	(0.815)	(0.907)
Exporter	0.0117	0.0272	0.0305	0.00951
	(0.675)	(0.244)	(0.183)	(0.692)
FC	-0.00953	-0.00685	-0.0158	-0.00317
	(0.750)	(0.803)	(0.537)	(0.918)
plogit	-0.0532	-0.194	-0.225	-0.201
	(0.773)	(0.174)	(0.104)	(0.214)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	429	430	540	407
R^2	0.181	0.200	0.164	0.212
adj. R^2	0.102	0.122	0.100	0.131

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.35 Second stage: Impact of public subsidies on employment growth in non-EU countries

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0561**	0.0539	0.0454**	0.0105
	(0.002)	(0.146)	(0.005)	(0.682)
Privatized	-0.0899***	-0.0887***	-0.0889***	-0.0926***
	(0.000)	(0.000)	(0.000)	(0.000)
Size	0.0385***	0.0373***	0.0389***	0.0381***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.0582***	-0.0613***	-0.0588***	-0.0565***
	(0.000)	(0.000)	(0.000)	(0.000)
Ownership	0.0000513	-0.00000209	0.0000598	-0.00000232
	(0.818)	(0.993)	(0.779)	(0.992)
Exporter	-0.00551	0.00629	-0.00186	0.00565
	(0.752)	(0.746)	(0.914)	(0.769)
FC	-0.0176	-0.00897	-0.0146	-0.0142
	(0.251)	(0.577)	(0.327)	(0.371)
plogit	0.103	0.0643	0.0400	0.0211
	(0.478)	(0.713)	(0.778)	(0.901)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	1734	1692	1866	1622
R^2	0.159	0.161	0.161	0.161
adj. R^2	0.135	0.137	0.139	0.136

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.36 Second stage: Impact of public subsidies on sales growth

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0686+	0.0922	0.0717*	0.00946
	(0.089)	(0.136)	(0.026)	(0.881)
Privatized	-0.0470	-0.0178	-0.0233	-0.0418
	(0.118)	(0.574)	(0.405)	(0.182)
Size	0.0328**	0.0255*	0.0289**	0.0298*
	(0.006)	(0.040)	(0.009)	(0.022)
Age	-0.0834***	-0.0866**	-0.0782***	-0.0790**
	(0.001)	(0.001)	(0.001)	(0.003)
Ownership	-0.000251	-0.000196	-0.0000709	-0.000258
	(0.515)	(0.620)	(0.847)	(0.525)
Exporter	0.0178	0.0164	0.0251	0.0108
	(0.632)	(0.673)	(0.464)	(0.792)
FC	-0.0152	-0.00688	-0.0140	-0.0176
	(0.580)	(0.802)	(0.583)	(0.536)
plogit	0.113	0.215	0.0271	0.0806
	(0.693)	(0.507)	(0.913)	(0.804)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	1788	1744	2004	1656
R^2	0.112	0.114	0.112	0.108
adj. R^2	0.084	0.085	0.087	0.078

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.37 Second stage: Impact of public subsidies on sales growth in the EU

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0248	0.0857	0.0319	0.00458
	(0.773)	(0.414)	(0.539)	(0.945)
Privatized	-0.0430	0.0163	0.0116	-0.0550
	(0.473)	(0.836)	(0.848)	(0.376)
Size	0.0318*	0.0189	0.0236	0.0373*
	(0.033)	(0.226)	(0.100)	(0.015)
Age	-0.0795*	-0.0649+	-0.0572+	-0.0712*
	(0.030)	(0.082)	(0.074)	(0.043)
Ownership	-0.000335	-0.000308	0.0000215	-0.000405
	(0.609)	(0.654)	(0.972)	(0.541)
Exporter	0.112*	0.0949+	0.120*	0.105+
	(0.046)	(0.074)	(0.015)	(0.060)
FC	-0.0176	-0.0142	-0.0412	-0.0342
	(0.719)	(0.779)	(0.377)	(0.482)
plogit	-0.274	-0.196	-0.273	-0.562*
	(0.338)	(0.484)	(0.267)	(0.040)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	396	394	494	372
R^2	0.193	0.175	0.153	0.205
adj. R^2	0.107	0.086	0.082	0.114

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.38 Second stage: Impact of public subsidies on sales growth in non-EU countries

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.0991*	0.0978	0.0985*	0.0732
	(0.024)	(0.178)	(0.013)	(0.491)
Privatized	-0.0292	-0.00379	-0.0126	-0.0194
	(0.394)	(0.913)	(0.696)	(0.585)
Size	0.0339*	0.0264+	0.0291*	0.0299+
	(0.021)	(0.094)	(0.038)	(0.067)
Age	-0.0925**	-0.0977**	-0.0917**	-0.0904**
	(0.003)	(0.002)	(0.002)	(0.006)
Ownership	-0.000162	-0.0000405	-0.00000858	-0.0000794
	(0.733)	(0.933)	(0.985)	(0.873)
Exporter	-0.00590	-0.00104	-0.00926	0.000604
	(0.899)	(0.983)	(0.833)	(0.991)
FC	-0.0173	-0.0159	-0.0187	-0.0271
	(0.604)	(0.644)	(0.558)	(0.443)
plogit	0.211	0.376	0.253	0.234
	(0.562)	(0.401)	(0.479)	(0.595)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	1376	1334	1490	1270
R^2	0.112	0.117	0.116	0.109
adj. R^2	0.081	0.084	0.087	0.074

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.39 Second stage: Impact of public subsidies on New Product Innovation

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.104*	0.229***	0.146***	0.156**
	(0.019)	(0.000)	(0.000)	(0.007)
Privatized	-0.0908***	-0.0729**	-0.0840***	-0.0923***
	(0.001)	(0.007)	(0.001)	(0.001)
Size	0.0520***	0.0481***	0.0488***	0.0545***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.0000325	0.00463	0.00553	0.00496
	(0.998)	(0.792)	(0.734)	(0.782)
Ownership	0.000194	0.000163	0.000202	-0.00000991
	(0.530)	(0.600)	(0.490)	(0.975)
Exporter	0.150***	0.155***	0.155***	0.156***
	(0.000)	(0.000)	(0.000)	(0.000)
FC	-0.0175	-0.0114	-0.0183	-0.0118
	(0.483)	(0.648)	(0.438)	(0.646)
plogit	-0.206	-0.258	-0.147	-0.441
	(0.439)	(0.360)	(0.529)	(0.125)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	2333	2291	2600	2191

The table reports marginal effects calculated at the mean and robust standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.40 Second stage: Impact of public subsidies on New Product Innovation in the EU

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	-0.0367	0.248*	0.0929+	0.186*
	(0.672)	(0.014)	(0.059)	(0.018)
Privatized	-0.0616	-0.131	-0.149*	-0.144
	(0.477)	(0.169)	(0.036)	(0.105)
Size	0.0294	0.0242	0.0223	0.0370
	(0.199)	(0.288)	(0.266)	(0.136)
Age	-0.0870*	-0.0650	-0.0294	-0.0628
	(0.039)	(0.107)	(0.422)	(0.129)
Ownership	-0.000172	-0.000640	-0.000304	-0.00117
	(0.803)	(0.368)	(0.621)	(0.112)
Exporter	0.0411	0.0140	0.0385	0.0628
	(0.505)	(0.826)	(0.488)	(0.346)
FC	-0.00532	-0.0176	0.0192	-0.0319
	(0.936)	(0.793)	(0.752)	(0.657)
plogit	0.0815	0.166	0.265	-0.129
	(0.840)	(0.690)	(0.421)	(0.772)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	460	461	580	437

The table reports marginal effects calculated at the mean and robust standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.41 Second stage: Impact of public subsidies on New Product Innovation in non-EU

	(1) classic	(2) inverse	(3) either	(4) both
Subsidy	0.135**	0.224**	0.175***	0.178+
	(0.010)	(0.002)	(0.000)	(0.053)
Privatized	-0.0950***	-0.0740**	-0.0806**	-0.0919**
	(0.001)	(0.008)	(0.003)	(0.002)
Size	0.0464***	0.0440***	0.0447***	0.0477***
	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.0145	0.0194	0.0135	0.0167
	(0.452)	(0.325)	(0.465)	(0.408)
Ownership	0.000218	0.000326	0.000314	0.000156
	(0.530)	(0.352)	(0.348)	(0.665)
Exporter	0.164***	0.183***	0.180***	0.176***
	(0.000)	(0.000)	(0.000)	(0.000)
FC	-0.0153	-0.00105	-0.0181	-0.00229
	(0.586)	(0.971)	(0.505)	(0.937)
plogit	0.427	0.211	0.356	0.101
	(0.238)	(0.593)	(0.294)	(0.800)
Macro controls	Yes	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
N	1854	1810	1996	1736

The table reports marginal effects calculated at the mean and robust standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.42 Second stage: Impact of public subsidies on New Process Innovation

	All countries	Only EU	Non-EU countries
Subsidy	0.104**	0.0457	0.156***
	(0.003)	(0.432)	(0.000)
Privatized	-0.106**	-0.0795	-0.109**
	(0.002)	(0.463)	(0.004)
Size	0.0708***	0.0396	0.0725***
	(0.000)	(0.138)	(0.000)
Age	0.0446+	0.0522	0.0571*
	(0.060)	(0.346)	(0.044)
Ownership	0.000291	0.000688	0.000284
	(0.453)	(0.397)	(0.524)
Exporter	0.113**	0.222**	0.0682
	(0.004)	(0.001)	(0.122)
FC	-0.0367	-0.0507	-0.0385
	(0.261)	(0.561)	(0.311)
plogit	-0.772**	-0.703	-0.390
	(0.008)	(0.106)	(0.293)
Macro controls	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
N	1277	259	984

The table reports marginal effects calculated at the mean and robust standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

Table 3.43 Second stage: Impact of public subsidies on Knowledge Acquisition Innovation

	All countries	Only EU	Non-EU countries
Subsidy	0.0966*	0.0750	0.135**
	(0.021)	(0.332)	(0.009)
Privatized	0.0735+	0.0259	0.0477
	(0.075)	(0.800)	(0.342)
Size	0.0606***	-0.00362	0.0723***
	(0.000)	(0.920)	(0.000)
Age	-0.0319	-0.00611	-0.0141
	(0.218)	(0.906)	(0.663)
Ownership	-0.0000954	-0.00115	-0.0000705
	(0.852)	(0.199)	(0.910)
Exporter	0.0815	0.104	0.0779
	(0.116)	(0.288)	(0.178)
FC	-0.00912	0.0680	-0.0233
	(0.829)	(0.479)	(0.675)
plogit	-0.704+	-0.0991	-0.823
	(0.055)	(0.835)	(0.103)
Macro controls	Yes	Yes	Yes
Survey wave dummy	Yes	Yes	Yes
Institutional controls	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
N	726	157	536

The table reports marginal effects calculated at the mean and robust standard errors clustered at country level.

p-values in parentheses

+ p<0.1, * p<0.05, ** p<0.01, *** p<0.001

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