The importance of the EU regional support programmes for firm performance[1]

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Abstract

This paper investigates the effects of the EU regional support on firms' productivity, number of employees and other firm performance indicators. For this purpose a rich firm-level dataset for Latvia – the country, where investment activities to a large extent depend on the availability of the EU funding – is used. The paper finds that participation in activities, co-funded by the European Regional Development Fund, raises firms' input and output soon after they embark on them, while the effect on labour productivity and TFP appears only with a time lag of three years. However, this positive productivity premium is not homogenous across firms and is more likely to materialize in the case of initially less productive and medium-sized/large firms. Furthermore, statistical significance of positive productivity gains is not particularly robust across different estimation procedures. The study also shows that after controlling for investment expenditures, EU sponsored projects are as efficient as privately financed ones, irrespective of where private financing comes from. All in all, the study suggests a room for improvements in the design of the EU co-financed activities.

Keywords: EU funds, productivity, firm-level data, propensity score matching

JEL code: C14, D22, R11

1. INTRODUCTION

Against the background of substantial gaps in economic developments across different regions of the European Union, the European Commission spends almost third of the total EU budget to facilitate convergence among its member states. To achieve this goal, the European Commission designed the EU Regional (or Cohesion) policy and adopted three cohesion funds as its main instruments.

Given high priority and political sensitivity of the EU regional support policy, its impact on growth and regional cohesion has been the issue of many empirical studies. The results of this body of literature has thus far been rather mixed as the positive effect of the EU funding on national/regional growth appears to be far from certain. Recently, the literature has started to be increasingly focused on the relevance of various factors for the effectiveness of the EU funding in achieving its goals. Among other factors, the presence of strong institutions and higher degree of decentralization have been shown

[1] The views expressed in this paper are those of the authors and do not necessarily reflect the views of Latvijas Banka or the OECD.

to foster the positive impact of the Cohesion policy. However, due to a lack of firm-level data the analysis of the effects of the EU funding has been mainly carried out at an aggregated (i.e. regional or national) level, while the assessment of the impact on firm productivity, employment and other firm performance characteristics has been limited so far.

To close this gap in the literature, we consider the effectiveness of the EU funding at a firm level with an emphasis on firm productivity improvements using the detailed firm-level dataset for Latvia. More specifically, we focus on the projects financed by the European Regional Development Fund (ERDF) which is particularly fit for our analysis as it is designed to boost innovation and competitiveness of individual companies in the EU's lagging regions. Latvia appears to be a very appropriate country for such an investigation as it is one of the largest recipients of the EU funds in relative terms. We contribute to the existing literature by examining the impact of the ERDF funding at a micro-level as well as by investigating the heterogeneity of the effectiveness of the ERDF funding across different firm and project characteristics. This would allow us identifying types of firms and projects that gain most from the implementation of the ERDF co-funded projects, thus presumably providing policy advice on improvements of the EU regional support. Furthermore, the paper analyses the impact of two different sources of investment financing (EU support versus private funding) on firm performance. Private funding is further split into predominantly own resources and loans.

We use a non-experimental matching approach that involves four stages. First, we estimate conditional probability of starting an ERDF co-funded project for each firm in the dataset using the probit setup. In the second stage, we use the estimated probability – *propensity score* – to match participants in the ERDF co-funded projects with non-participants similar on a variety of observable characteristics, thus controlling for a selection bias. We employ several matching strategies (drawing different number of nearest neighbours, without and with a caliper to avoid poor matching) to ensure robustness of our estimates. Third, we compute the difference-in-difference (DiD) estimator for several firm performance characteristics. Finally, we consider the possibility of heterogeneity in the effects of the EU funding, i.e. we examine whether a magnitude of the DiD estimator is associated with certain firm characteristics or project features.

Our results show that obtaining the EU support from the ERDF is followed by increasing company's capital-to-labour ratio, number of employees, and therefore also output and sales. This result is far from surprising, as many of the EU co-funded activities we consider in our study are ERDF sponsored *investment* projects. Interestingly the effect on productivity is not significant in the first two years, although companies manage to raise their productivity starting from the third year. However, statistical significance of the latter result is not robust to a change in the matching strategy. Finally, productivity gains in the third year (even if with low significance on average) are estimated to be larger for initially bigger and less productive firms.

When comparing the EU co-funded projects with privately financed ones we conclude that in the former case companies tend to employ a larger number of additional employees. At the same time productivity gains are not statistically different across two sources. Splitting private financing further into predominantly own resources and loans from credit institutions does not reveal any additional evidence of superiority of one of the funding sources. Nevertheless we find that firms receiving ERDF grants have bigger

wage increases than firms that carry out projects from own resources, while this difference is not significant when compared to debt financed projects.

All in all, our findings point out at lags in newly acquired capital utilization presumably due to several reasons. One of them could be the presence of knowledge gaps, i.e. employees' lack of necessary skills to gain most of the newly acquired capital. It may take time for them to accrue expertise. Another possible explanation we suggest in our study is inadequate market size and smaller than necessary degree of firms' internationalisation. Finally, our findings may indicate poor design of operational programmes in the financial framework studied in this paper. However when interpreting the results of this study, one should bear in mind that many of the activities co-funded by ERDF take considerable time to get fully implemented, hence the economic effects of such projects may not yet materialized.

The remainder of our study is organized as follows. The next section briefly explains the main tenets of the EU regional support policy, its design, objectives and main figures of the recently concluded EU financial framework 2007–2013. It explains the role of the ERDF funding within this framework. Section 3 summarizes previous research at a national and regional level as well as takes a look at the related literature that uses micro level data. Section 4 explains the construction of the dataset we use in the analysis. In Section 5 we describe in more detail the methodology employed in this study. Among other things we explain the way total factor productivity is estimated for each firm in the dataset. Section 6 presents our estimation results. Finally, Section 7 concludes and provides policy recommendations.

2. EU REGIONAL SUPPORT POLICY TOOLS

2.1. **Multi-year financial framework 2007–2013: design, objectives and main figures**

Given substantial disparities within the European Union, its Regional policy is aimed at improving quality of life in the least developed regions, thus rendering the Union a more developed and economically balanced political entity. The legal basis for the EU's Regional policy was provided in the Single European Act in 1986 that created a large internal market and deepened political and economic cooperation of the EU member states. In 1989, the European Commission introduced multi-annual planning and has ever since approved several multi-annual budgets that allocated resources to various objectives, among them regional support and cohesion.[2] Regional policy's objectives (their number and names), resource allocation rules and instruments have only slightly changed since 1989, while the volume of funds allocated and their share in total EU budget expenditure increased substantially reflecting the process of the European Union enlargement.[3]

The latest concluded multiannual financial framework 2007–2013, that we analyse in this study and whose total financing in constant 2004 prices amounted to 308 bill EUR, was adopted in 2006 and envisaged three priorities of the EU Regional policy:

[2] EU Regional Cohesion along with the Common Agricultural Policy are EU's most important policy areas and are the biggest spending items of the EU budget (86% of total EU budget expenditure in 2014).
[3] Budgetary allocation to structural policies increased from 5.7 bill ECU (16% of total expenditure) in 1986 to 25.5 bill EUR (31%) in 2000 and 64.0 bill EUR (45%) in 2014. For more historical data on EU budget spending see European Commission (2009) as well as information provided in http://ec.europa.eu/budget/annual/index_en.cfm?year=2014.

Convergence, Regional competitiveness and employment, European territorial cooperation.[4] Three instruments used for these priorities are: the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF). The former two are largely employed to invest in growth enhancing infrastructure projects, innovation, communication (ERDF) and social policies (ESF). In turn the Cohesion fund was introduced only in the mid-90s and has been used for large transport related network and environmental projects (European Commission, 2014).

By far the most important and generously funded objective is Convergence (80% of total financing on regional support). Its main purpose is to stimulate growth and employment in the lagging regions thus reducing gaps in economic and social developments and fostering Cohesion within the European Union. To be eligible for the Convergence financing from the ERDF and ESF, a region's GDP per capita should be less than 75% of the Community's average.[5] This rule does not apply to the Cohesion Fund whose resources are designated to member states with GNI per capita not exceeding 90% of the EU average. For Latvia compliance with these eligibility criteria effectively means that the whole country is entitled to all three instruments under the Convergence objective. More prosperous EU regions, that are not eligible for the Convergence objective, may receive funding under the objective of Regional competitiveness and employment financed by the ERDF and ESF. The third objective – Territorial cooperation, whose only instrument is ERDF, is designed to promote cooperation at the cross-border, transnational and interregional level (European Commission, 2007). Hence the whole EU is covered by the regional support policy, yet the bulk of financing is dedicated to the least developed regions, thus constituting a tool to redistribute welfare across member states.

Every multi-annual financial framework addresses certain strategic priorities in the EU that are relevant at the moment of its approval. Three priorities of the financial framework 2007–2013, as laid out in the European Council (2006) guidelines, are: a) expanding and improving transport infrastructure, while preserving the environment, b) encouraging entrepreneurship and promoting innovation, c) investment in human capital: creating more jobs and improving adaptability of employees.

There are several conditionalities related to the absorption of the EU funding. First, EU funding is supposed to be complemented by national resources (public or private, depending on which entity implements a project). The rate of national financing depends on an objective and a project varying, on average, between 15% (for projects financed by the Cohesion Fund) and 50% (for projects within the framework of Regional competitiveness and employment). Second, the EU funding should not replace national spending. Third, the committed funds may be called up until two years after the end of the programming period, i.e. in the case of the financial framework 2007–2013 funding should be drawn upon by the end of 2015.

As the main concern of this study is the effect of the EU regional support on firm performance, including productivity and competitiveness, in what follows we consider only those projects that are financed by the European Regional Development Fund. This instrument of the EU regional policy was established in 1975 initially to assist declining industrial regions. From the very beginning it was also the first instrument of the EU policy to redistribute income within the Community. Ever since the scope of

[4] See Council Regulation No 1083/2006 for details of the 2007–2013 financial framework.

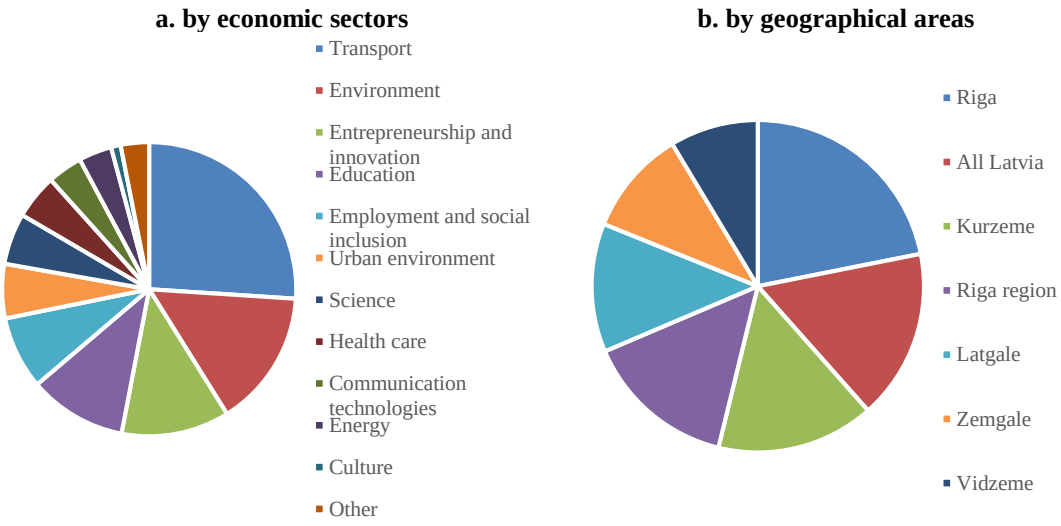
[5] More specifically a region's GDP per capita should be less than 75 percent of the average GDP of the EU-25 during the period 2000–2002.

this fund has become much broader and currently it is the only instrument that supports all three above mentioned priorities of the EU regional policy which effectively makes all EU countries eligible for ERDF resources. This instrument, among other goals, is designed to support entrepreneurship and foster competitiveness of private firms in the least developed EU regions.

2.2. **EU funding in Latvia in 2007–2013**

Latvia, whose GDP per capita is 64% of the EU-28 average[6] is one of the largest recipients of the EU regional support in relative terms. On average it amounts to around 3.0% of GDP per year.[7] Most of the supported projects fall into Convergence objective and are designed along three operational programmes. One of them is the operational programme *Human resources and employment* (0.6 bill EUR), funded by the ESF. It is looking to raise the quality of human resources in Latvia, by improving access to employment via active labour market policies, fostering education and social inclusiveness and reducing poverty. During the financial and economic crisis, activities carried out within this operational programme provided essential financial support to most vulnerable groups of Latvian population, that were particularly strongly hurt during the crisis. Another operational programme, funded solely by ERDF, is *Entrepreneurship and Innovation* (0.7 bill EUR). Its numerous activities are focused on promotion of innovation and spreading of knowledge ultimately aimed at increasing competitiveness of Latvian economy. By far the largest operational programme, funded by both ERDF and the Cohesion fund (3.2 bill EUR) is *Infrastructure and services*, that has broad priorities and is aimed at advancing infrastructure, developing transport network and improving business environment.

Figure 1. Allocation of the 2007–2013 programming period's EU funding in Latvia



Source: www.esfondi.lv.

[6] http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tec00114.

[7] This figure does not account for funding available from European Agricultural Fund for Rural Developments (EAFRD) and the European Maritime and Fisheries Fund (EMFF) which are EU Regional support instruments in Agriculture and Fishing respectively.

The composition of the EU funding in Latvia by activity areas and regions is summarized in Figure 1. Around quarter of all projects are implemented in the field of Transport, followed by Environment (15%), Entrepreneurship and innovation (12%), and Education (11%). Looking at the regional dimension of the EU supported projects around third of them are carried out in Riga or Riga district. Therefore, there is clear evidence of regional aspect, as each part of Latvia gets its share of the pie (roughly in accordance to the share in total population).

3. ASSESSING EFFECTIVENESS OF EU REGIONAL POLICY: REVIEW OF STUDIES

The convergence effect of the EU regional support has been extensively examined in a number of econometric studies using aggregated national or regional level data (see Hagen and Mohl, 2011 for a survey). The results of this body of literature has thus far been rather mixed as the positive effect of the EU funding on national/regional growth appears to be far from certain. However, while these studies differ with respect to the choice of the sample, time period, econometric approach and other parameters, some of them find evidence of a positive effect of the EU support on regional convergence provided the presence of strong institutions in a recipient region/country that increase the quality of planning and implementation of projects (e.g. Ederveen et al., 2006; Gruševaja and Pusch, 2011), high openness of the economy (Ederveen et al., 2003) and higher degree of decentralisation (Bahr, 2008). The growth effect of the EU funds has also been shown to be larger when spending is more evenly spread across different items (Becker et al., 2016), but appears to have been lower during the period of the Great Recession (Bachtrögler, 2016), i.e. over the programming period 2007–2013 we consider in our paper.

The impact of the EU funding on firm performance has not been thoroughly investigated yet, probably due to a lack of detailed firm level data. Yet, those few studies that evaluate EU policy intervention effects apply a non-experimental setting to assess the impact of participation on firms' mean output, employment or/and productivity. They follow standard microeconometric methods usually employed in impact evaluation of participation in various national or regional support programmes: active labour market policies (see e.g. Lechner, 2001), financial support of local enterprises (Bia and Mattei, 2012), tax credits (Bozio et al., 2014), environmental public policies (List et al., 2003), and other public interventions. Thus, Pufahl and Wess (2009) reveal a positive effect of enrolment in EU farm programs on individual farm sales in Germany. However, the authors do not find any evidence of the positive effect on farm productivity. The EU support of R&D is shown by Arce and San Martin (2016) to have a positive effect on Spanish companies' internal investments in R&D and employment. As regards the effect of the EU regional policy on regional firm performance de Zwaan and Merlevede (2014) consider firm level data for manufacturing firms in all EU member states in 2000–2006. They show that the EU regional support has no impact on employment or productivity. However, the authors do not have data on the recipient status of firms and hence employ a two-tiered matching procedure. They use the propensity score approach to match regions that receive EU funding with those that do not, and then firms in a former group of regions are compared with those that are registered in the latter group. The recent paper by Bachtrögler et al. (2017) is the first one to consider the EU-wide dataset of over two million individual projects co-financed by the EU regional funds in the programming

period 2007–2013. Using this rich dataset and combining it with business data from ORBIS database they provide an econometric analysis of the determinants of project values. Largest individual projects are found to be those that a) are co-funded by the ERDF, b) fall within Convergence objective, c) are transport-related activities, d) are implemented by very large companies (as classified by ORBIS).

Thus, to the best of our knowledge this study is the first one to assess the effectiveness of the EU Regional policy, in particular ERDF funding, in fostering productivity and competitiveness of firms in less developed regions.

4. DATA

4.1. **EU funds dataset**

For the purpose of the study, we combine several firm-level datasets. The key ingredient of our empirical analysis is a detailed anonymized dataset of entities[8] receiving EU funding from the ERDF, ESF and the Cohesion Fund, provided by the Ministry of Finance. This dataset holds information on the amounts received, starting date and end date, economic sector and location of projects as well as the degree of projects' risk. The dataset covers the EU programming period 2007–2013. However, the first year when entities start making use of the funds available in this period is year 2009 since the committed funds of the previous programming period 2004–2006 can still be used up until 2008. Similarly, due to the presence of this N+2 rule, in 2014, the end year of our dataset, entities continue undertaking activities and receiving funding related to the 2007–2013 period. Overall, we have 2165 entities obtaining regional support from ERDF, 534 – from ESF and 205 from the Cohesion Fund. As one entity may be involved in several projects, the total number of projects included in the dataset is larger, 6493.

As the purposes of these funds differ so does the average project size (in terms of funding received) and the average length of a project. By far the longest and largest projects are those financed by the Cohesion fund as these are mainly activities related to improvements in large transportation networks. Relatively smaller activities are those co-funded by ERDF as this instrument was designed to aim at raising competitiveness of small and medium enterprises.

Ultimately, around half of entities had to be dropped from the analysis. First, we had to exclude the ESF and the Cohesion Fund co-financed activities as most of them are projects executed by state institutions (Employment Agency, Local Government etc.) and their inclusion does not comply with the purpose of this study. Many ERDF beneficiaries are also public sector institutions and hence are also excluded. Second, there are cases where we lack some of firm performance indicators we analyse, hence such firms are also excluded. Thus, we end up with ERDF co-financed projects carried out by 994 companies. In fact, however, the number of firms used in the empirical analysis is even smaller, as the subsequent performance of those companies that started receiving ERDF funding in 2013 or later is not yet observed and the sample is restricted to years until 2013. Furthermore, outlying observations are automatically excluded from the empirical analysis.

Two thirds of the firms we consider in our analysis fall into the operational programme *Entrepreneurship and Innovation* with the activity – Entrepreneurship support –

[8] These are enterprises, state agencies, local governments and other legal entities.

constituting around 60% of all such companies. Most of the entrepreneurship support takes the form of the promotion of firms in the foreign markets or aims at facilitating the developments of micro, small and medium enterprises in lagging regions. 13% of companies we consider in the study receive financial support for investments with high value added and innovation related activities. The rest one third of firms under consideration implement projects classified under the operational programme *Infrastructure and services*, largely investments in human capital as well as environmental projects. Even though this operational programme is the biggest one in terms of total financing available, the bulk of it is provided from the Cohesion fund and implemented by public institutions that are out of scope of this study.[9]

4.2. **Latvia's firm-level database**

To perform the analysis of the EU support effectiveness, we need a counterfactual comprising non-beneficiaries of the EU programmes and a set of impact variables for both groups of firms. To this end, we make use of few other anonymized firm-level datasets, provided by the Central Statistical Bureau of Latvia (CSB) and Latvijas Banka, that contain a myriad of firm specific characteristics for a representative sample of Latvian commercial enterprises in most areas of activities.[10] These datasets are described in Appendix. Combining all these datasets together, we obtain a large firm-level database that contains information for the period 2006–2014, with the number of firms varying between 61'159 in 2006 and 99'466 in 2014.

Table 1 below shows that comparing with population aggregates from Structural Business Statistics (published by CSB) the firm-level dataset at hand provides a very high coverage of Latvian enterprises in terms of their number, value added or employment. The coverage remains high even for small firms.

Table 1. Distribution of firms by size according to Structural Business Statistics and firm-level dataset in 2014 (B-N, S95, excluding K)

Size classes (number of employees)	Number of firms			Value added (th. EUR)			Number of employees		
	Structural business statistics	Firm-level dataset	Coverage, %	Structural business statistics	Firm-level dataset	Coverage, %	Structural business statistics	Firm-level dataset	Coverage, %
0–9	91085	72236	79.3	2056.2	1981.4	96.4	198.0	194.4	98.2
10–19	4739	3360	70.9	833.8	701.3	84.1	63.3	45.1	71.3
20–49	2979	2502	84.0	1432.3	1348.0	94.1	89.1	75.6	84.8
50–249	1486	1551	104.4	2798.2	2947.8	105.3	140.6	150.0	106.6
250–…	202	263	130.2	2966.1	3286.1	110.8	128.7	166.5	129.4
Total	100491	98506	98.0	10086.7	10412.0	103.2	619.7	631.6	101.9

Source: CSB, Latvijas Banka, authors' calculations.
Notes: The sum of variables for 5 size classes does not correspond to the number in the last row due to missing data on number of employees for some firms.

We eliminate outlying observations following Lopez-Garzia et al. (2015), who apply a multi-step exclusion procedure based on the values of various ratios (capital, turnover,

[9] Few of these projects are very big infrastructure projects and each of them alone amount to more than 100 mill EUR.

[10] We excluded firms from agriculture, forestry and fishing (A), financial and insurance activities (K), public administration and defence (O), education (P), health (Q), arts, entertainment and recreation (R), and other services activities (S, except S95, repair of computers and personal and household goods) due to the lack of data or specific nature of the sector.

labour costs, intermediate inputs and value added to labour or capital) and their numerator and the denominator.[11] By that we remove slightly more than 2% of observations for value added, turnover, capital and wage, while only less than 1% of observations were removed for the number of employees or intermediate inputs. More important data losses come from non-reporting of several variables (e.g. number of employees or size of fixed assets), a problem that is more pronounced for small enterprises. All in all, after excluding the outliers and accounting for missing values, we end up with data on 25–30 thousand firms annually.

Finally, several variables were deflated to obtain real values: we deflate value added and intermediate inputs by industry-specific value added and intermediate inputs deflators reported by the CSB. Capital stock is deflated by investments deflator.

5. METHODOLOGY

5.1. **Propensity score matching approach**

For the purpose of this study and in line with other related literature on the effects of participation in various public intervention programs, we employ a non-experimental matching technique.

We let the term $eu_{i,t} \in \{0,1\}$ to indicate whether a firm i (*treated firm*) starts an ERDF co-financed project in year t; the variable $\Delta Y^1_{i,t+s}$ to denote the growth rate of a performance indicator (e.g. change in productivity) of a treated firm at time t+s;[12] while $\Delta Y^0_{i,t+s}$ to define the hypothetical growth rate of a performance indicator of the same firm, had it not participated in the ERDF co-financed project. Following Heckman et al. (1997), the average casual effect following the involvement into the ERDF co-funded project can be represented as:

$$E\left[\Delta Y^1_{i,t+s} - \Delta Y^0_{i,t+s} \middle| eu_{i,t} = 1\right] = E\left[\Delta Y^1_{i,t+s} \middle| eu_{i,t} = 1\right] - E\left[\Delta Y^0_{i,t+s} \middle| eu_{i,t} = 1\right]. \quad (1)$$

Obviously, the counterfactual outcome $\Delta Y^0_{i,t+s}$ is unobservable (second term in (1)). To construct a reliable counterfactual we rely on the performance of those firms (*non-treated or control firms*) that do not receive ERDF funding, i.e. $E\left[\Delta Y^0_{i,t+s} \middle| eu_{i,t} = 0\right]$. These firms can serve as an appropriate counterfactual if treated firms and firms that do not participate in ERDF co-funded projects have very similar initial characteristics. In such a case, we can expect that the selection bias gets insignificant.

In order to approximate the counterfactual $E\left[\Delta Y^0_{i,t+s} \middle| eu_{i,t} = 0\right]$ accurately, one can employ matching technique: pairing each treated firm (receiving EU support) with a similar firm from a valid control group on the basis of some observable characteristics. Hence the idea is to select such non-treated firms that exhibit the distribution of factors as similar as possible to those of treated companies. To remove the selection bias, the set of such factors should include all possible determinants of participation in an ERDF co-financed project (initial productivity, size, age, experience in EU funds absorption, exporting status etc.).

[11] First, the given ratio is replaced by a missing in case of an abnormal growth – more than two interquartile ranges above or below the median growth in a respective sector and year. Moreover, the procedure identifies the source of the extreme growth (numerator or denominator) and replaces it with a missing. Second, the variable is replaced with a missing if it's ratio with respect labour or capital falls into top 1 and 99 percentile of the distribution for the respective ratio.

[12] $s \geq 0$, so that we analyse the performance after launching an EU supported project.

In this study, we employ the propensity score matching approach (PSM, see Rosenbaum and Rubin, 1983). Matching is performed based on a single index that measures the probability of a firm to start an ERDF co-funded project conditional upon initial characteristics of a firm. To identify this probability a probit model of the following form is estimated:

$$Pr\left[eu_{i,t} = 1\right] = \Phi\left[X_{i,t-1}, Sec_i, Year_t\right], \quad (2)$$

where $X_{i,t-1}$ denotes the set of initial characteristics (in the prior period t–1 to ensure exogeneity). Some of nonlinear terms and interactions are also included to avoid inappropriate constraints on the functional form of Φ, alongside a set of dummies to control for a sector in which a firm operates (Sec_i, defined at the 2-digit NACE level) and a year ($Year_t$).

We denote an estimated probability of starting an ERDF co-financed project for a firm i at time t in sector k as $P_{i,k,t}$. A control firm j with closest propensity score (i.e. closest predicted probability) is selected as a match for a treated firm. Thus we ensure that firms have similar characteristics before obtaining ERDF funding and are comparable We employ the nearest-neighbour matching method both with and without a caliper that requires a control firm j to be chosen within a certain probability distance:

$$\lambda > \left|P_{i,k,t} - P_{j,k,t}\right| = \min_{j \in \{eu_{j,k,t}=0\}} \left(\left|P_{i,k,t} - P_{j,k,t}\right|\right). \quad (3)$$

where λ is a caliper, i.e. a pre-specified scalar that determines maximum allowed difference in predicted propensity score. If there is no firm found in λ proximity to the treated firm, then the treated firm is excluded from further analysis. Matching occurs only within a specified year and NACE sector to ensure comparability of variables between firms. Alongside one nearest-neighbour matching, we also use two and five nearest-neighbour matching technique and search for two and five control firms (accordingly) with the closest propensity score.

Having selected the control group (C) of non-treated matched firms that are similar to the EU support receiving treated firms (T), we adopt the standard *difference-in-difference* (DiD) methodology. It follows the two-step procedure. First, the growth rate in a firm performance indicator is calculated with respect to the pre-entry year for both treated and non-treated firms. Then, the means of growth rates are compared and statistical significance of their differences is estimated:

$$\delta_{DiD,s} = \frac{1}{N_T} \sum_{i,t \in T} \left(\Delta Y_{i,t+s} - \sum_{j,t \in C} w_{ij} \Delta Y_{j,t+s}\right),\ s \in \{0,1,2\}, \quad (4)$$

where $\delta_{DiD,s}$ represents the DiD estimator s years following project launch, N_T denotes the number of treated firms, but w_{ij} are the weights of controls generated by the matching algorithm.

The effects of ERDF co-financed project implementation on firm performance may vary depending on initial characteristics of a firm (productivity and size prior to participation), or parameters of a project (amount of funds received, degree of project's risk, region where a project is undertaken etc.). To gauge the heterogeneous effects on firm performance we estimate the following equation stating the DiD estimator s years after the start of a project as a function of pre-treatment characteristics and project parameters:

$$\left(Y_{i,t+s} - \sum_{j,\tau \in C} w_{ij} Y_{j,\tau+s}\right) = \alpha_o + \alpha_1 F_i + \alpha_2 Z_i + \alpha_3 Macsec_i + \alpha_4 Year_i + e_{i,t}, \quad (6)$$

where F_i denotes firm characteristics, Z_i – project parameters.We control for a broad macroeconomic sector ($Macsec_i$)[13] in which a firm operates and a year when it launches a project ($Year_i$).

As mentioned above, one firm can participate in several ERDF co-funded projects. But we cannot distinguish between the effect of each individual project, as projects may overlap. Thus, we are interested in the effect of receiving EU support *per se* and add together all projects for each individual firm. Dummy variable $eu_{i,t} = 1$ when a firm launches it's first ERDF co-funded project during the multiannual financial framework 2007–2013.[14] For example, if the first project starts in June 2009, $eu_{i,2009} = 1$, and we analyse the performance of the firm in 2009, 2010 and 2011, comparing with the control firm that was matched based on the performance in 2008.[15]

5.2. **Total factor productivity estimates**

Not all of firm performance variables are observable and are part of the dataset. In particular, we are interested in the effect of participation in ERDF co-funded projects on total factor productivity (TFP), which should itself be estimated. Here we follow the approach by Galuscak and Lizal (2011) who use a more elaborated version of Wooldridge (2009) methodology. Assuming that the production function is of Cobb-Douglas form, we estimate its coefficients by running the following pooled IV regression:

$$lnVA_{i,t} = \beta_0 + \beta_1 lnK_{i,t} + \beta_2 lnL_{i,t} + h^{-1}\left(lnK_{i,t-1}, lnM_{i,t-1}\right) + \gamma Year_t + \varepsilon_{i,t} + u_{i,t}, \qquad (7)$$

where $VA_{i,t}$, $K_{i,t}$, $M_{i,t}$ are real value added, real capital and real intermediate inputs respectively for the firm i, $L_{i,t}$ stands for the number of employees, $\varepsilon_{i,t}$ is an unexpected shock to the productivity process (that follows random walk with a drift), while $u_{i,t}$ represents the *iid* error term. Function h^{-1} is approximated with a polynomial of order three. Since number of employees and TFP are simultaneously determined, while capital takes time to build up, the log of employees is instrumented by its own lagged values.

We compute firm-level TFP ($TFP_{i,t}$) as a residual:

$$\widehat{lnTFP_{i,t}} = lnVA_{i,t} - \hat{\beta}_0 - \hat{\beta}_1 lnK_{i,t} - \hat{\beta}_2 lnL_{i,t} - \hat{\gamma} Year_t. \qquad (8)$$

Similar to Lopez-Garzia et al. (2015), the estimation is performed at a 2-digit industry level. However, β and γ coefficients are replaced by estimated values obtained at a corresponding macro-sector if a sector has less than 25 observations per year. Estimation results can be found in Table A1 in the Appendix.

[13] We classify 2-digit NACE industries into the following eleven broad macroeconomic sectors: (1) mining and quarrying, (2) manufacturing, (3) energy and water supply, (4) construction, (5) wholesale and retail trade, (6) transportation and storage, (7) accommodation and food service activities, (8) information and communication, (9) real estate activities, (10) professional, scientific and technical activities, (11) administrative and support service activities.

[14] We cannot observe whether a firm received EU funding during the previous multiannual financial framework of 2000–2006 due to the lack of necessary data. However, the amount of such firms is smaller since Latvia joined the EU only in May 2004.

[15] Note that the starting date of the project does not correspond to the first transfer of the EU funds to the firm, which usually comes later.

6. EMPIRICAL RESULTS

6.1. **Assessing the impact of participation in ERDF supported activities on firm performance**

6.1.1. *Conditional probability of participation*

First, we calculate firms' propensity scores, i.e. conditional probabilities to launch an ERDF co-funded project. As mentioned above, we accomplish this by estimating a probit regression where we account for the following factors: firm's productivity (measured as value added per employee), firm's age (number of years since it has been established), number of employees, capital-to-labour ratio, liquidity ratio (represented by the cash-to-assets ratio), indebtedness indicator (debt-to-assets ratio), ratio of goods and services exports to turnover, share of employees (managers) with an experience working for a firm that carried out ERDF co-funded projects in the past. We also include square terms of some of these variables. Finally, we control for a year and a sector of the economy in which a firm operates. To avoid problems associated with reverse causality all the covariates used are taken with one-period lag.

Prior turning to the results of the empirical estimation we perform a simple comparison of several firm characteristics between ERDF beneficiaries and non-beneficiaries. Table A2 in the Appendix shows that on average ERDF beneficiaries are older, employ a larger number of employees and exhibit higher productivity as compared to a sector average. Furthermore, it is also evident from visual inspection of kernel density of the log of labour productivity and the log of TFP of beneficiaries and non-beneficiaries of the ERDF (see Figure A2) as well as from the results of the Kolmogorov-Smirnov test[16] that productivity distributions of participants in ERDF co-funded projects tend to stochastically dominate those of non-participants. Importantly, there is a much smaller number of observations in the lower tail of the productivity distribution of beneficiaries. ERDF beneficiaries also tend to be more oriented towards foreign markets as indicated by a higher share of exports of both goods and services in their turnover.

Some of these regularities are confirmed by the estimation results of the probit regression (equation (2)) reported in Table 2. In the first specification that includes all observations in the dataset, labour productivity appears positive and statistically significant, implying that more productive firms indeed have a-priori higher probability to participate in an ERDF co-funded activity. In the second specification, the sample is restricted to years until 2012 as the subsequent performance (in t+1 and t+2) of those companies that started receiving ERDF funding in 2013 or later is not observed and these are therefore automatically excluded from further analysis. In this restricted sample we still confirm a positive labour productivity effect, but it appears now of a non-linear nature and is more pronounced for more productive firms.

Being a younger firm (rather than an older – as suggested by merely comparing mean values in Table A2), having a larger firm size and higher capital-to-labour ratio is associated with higher participation probability, although the latter effect appears smaller for companies with very high capital-to-labour ratio. Also, the share of exports of goods in a firm's turnover is positively associated with participation, probably meaning that being a player in the global market allows reaping the benefits of investments more easily and encourages firms to apply for the EU funding, but also merely reflecting the fact that exports potential is one of the applicants assessment criteria. As companies by rule are required to cover a certain share of total costs of an

[16] Not reported here, but available upon request.

EU co-funded project from their own resources, we expect the coefficient on the liquidity ratio to be positive and statistically significant. However, this coefficient, even though positive, is not statistically significant in the second sample probably due to a short length of the restricted sample period. Similarly, while the coefficients before the share of employees and managers with prior experience in EU co-financed projects appear positive, these are not statistically significant at any conventional level in the restricted sample (perhaps the role of experience appears to be important only at the end of the sample period). Finally, those companies that are part of multinational groups that originate in one of the OECD countries do not seem to be particularly interested in applying for the EU regional support as the coefficient is negative and statistically insignificant in both samples.

Table 2. Factors affecting the probability to launch an ERDF co-funded project (probit estimates, 2008–2014 for full sample and 2008–2012 for PSM sample)

Variables	Full sample	PSM sample
	(1)	(2)
Log of labour productivity	0.049**	0.015
Log of labour productivity square	0.007	0.028***
Age	-0.047***	-0.070***
Age square	0.002***	0.003***
Log of employment	0.289***	0.380***
Log of employment square	-0.003	-0.009
Log of capital to labour ratio	0.069***	0.100***
Log of capital to labour ratio square	-0.012***	-0.024***
Liquidity ratio	0.149*	0.135
Indebtedness ratio	-0.000	0.000
Exports of goods to turnover	0.487***	0.490***
Exports of services to turnover	0.075	-0.120
Owner from OECD countries (dummy)	-0.212***	-0.307***
Owner from non-OECD countries (dummy)	-0.040	-0.178
Share of employees with EU funds experience	0.429**	0.338
Share of managers with EU funds experience	0.638***	0.517
Year effect	Yes	Yes
Sector effect	Yes	Yes
Number of observations	212'242	57'836
Pseudo R^2	0.22	0.25

Source: CSB, Latvijas Banka, authors' calculations.
Note: The full sample is comprised of all observations in the dataset, the PSM sample is restricted to firms that started to receive EU funds prior to 2013, since we need to observe their performance for the next 2 years. *(**)[***] denotes significance at 0.1(0.05)[0.01] level.

As already indicated above, some of these results corroborate with the assessment criteria for participation in ERDF co-funded activities. Thus, companies' submitted applications for funding in such activities as *Promotion in the foreign markets* or *Creation of new products and technologies* are assessed based on a firm's (or industry's average) exports intensity.[17] Labour productivity, measured as value added per employee, is one of key ingredients in assessing applicants for participation in activity *High value added investments*.[18] Employees' wage level is an evaluation criteria for participation in the activities *Creation of new products and technologies* and *High value added investments.* Few activities (such as e.g. organization of international

[17] https://m.likumi.lv/doc.php?id=194223 (Chapter 47.1), https://likumi.lv/doc.php?id=219070 (Annex 3).
[18] https://likumi.lv/doc.php?id=238461#p46&pd=1 (Annex 4).

conferences on exports promotion) also require firms to have the turnover level above a certain threshold.[19]

6.1.2. *Matching using nearest neighbour approach*

Propensity scores, computed using the coefficients derived from the probit regression (using column (2) from Table 2), are key elements to perform matching for each treated firm. The quality of matching is considered successful if it eliminates pre-treatment differences (evident in the first column of Table 3) between characteristics of firms that participate and do not participate in the EU regional support. As mentioned above, matching is implemented using the nearest neighbour approach by additionally requiring that all combinations of firms come from the same year and sector of the economy. Letting the opposite occur may have a distortive effect on the evaluation of treatment effects given substantial fluctuations in Latvian economic developments across years and sectors. To ensure robustness of our results we perform matching with 1, 2 and 5 nearest control firms as well as without and with a caliper (with the value of 0.05), i.e. the highest allowed propensity score difference between treated companies and their matched controls, to get rid of potentially bad matches. Finally, we use only those observations that comply with the common support condition, that excludes treated firms with a propensity score lower than the smallest one among control firms and eliminates control firms whose propensity score exceeds the maximum one of the treated firms.

Table 3. Quality of matching for various methods

Variables	Difference in means of characteristics of treated and control companies (%) using various methods of matching						
	Unmatched	1 nearest neighbour	2 nearest neighbours	5 nearest neighbours	1 nearest neighbour with caliper	2 nearest neighbours with caliper	5 nearest neighbours with caliper
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log of labour productivity	39.6***	-4.7	-4.2	-2.5	-5.3	-4.2	-3.6
Log of labour productivity square	38.1***	0.9	-1.9	0.3	0.4	-1.6	-0.9
Age	19.9***	0.0	2.5	0.9	-1.5	0.4	-1.6
Age square	22.0***	0.9	3.3	1.2	-0.9	0.7	-1.5
Log of employment	118.5***	6.4	9.4	14.0**	3.1	4.4	6.8
Log of employment square	106.6***	10.5	13.2	19.4**	5.6	5.8	9.4
Log of capital to labour ratio	29.7***	1.7	0.6	1.8	-0.3	-1.4	-1.2
Log of capital to labour ratio square	7.9	4.5	0.4	0.9	2.6	-1.4	-1.5
Liquidity ratio	-6.1	8.8	3.8	0.5	8.9	4.0	0.6
Indebtedness ratio	-2.9	0.2	0.0	-0.2	0.2	0.4	-0.2
Exports of goods to turnover	75.3***	2.4	1.7	4.9	0.1	-2.5	-2.5
Exports of services to turnover	8.8*	-13.4	-8.5	-6.2	-13.7	-8.8	-7.0
Owner from OECD countries (dummy)	23.6***	7.8	5.9	7.0	5.4	2.0	3.3
Owner from non-OECD countries (dummy)	14.8***	0.0	-5.1	0.0	0.0	-7.3	-2.3
Share of employees with EU funds experience	7.4	4.9	-3.0	-0.1	5.3	-3.0	-0.2
Share of managers with EU funds experience	15.6***	5.1	4.4	0.6	5.4	4.1	-0.2
Number of treated		390	390	390	380	380	380
Number of control		360	684	1570	351	661	1490

Source: CSB, Latvijas Banka, authors' calculations.
Notes: *(**)[***] denotes significance at 0.1(0.05)[0.01] level. Caliper set to 0.05 in columns (5)–(7).

[19] https://m.likumi.lv/doc.php?id=194223 (Chapter 21).

Matching quality is satisfactory for most variables using nearest neighbours matching technique without a caliper, as differences in means of firm characteristics among treated and control firms prior to starting a project are statistically insignificant. The only exception refers to a number of employees when five nearest neighbours are used. However, setting a propensity caliper solves this problem and improves the quality of matching at a cost of losing few observations.

6.1.3. *Difference-in-difference estimators*

We estimate difference-in-difference, by comparing changes in mean values of firm characteristics in three consecutive years with respect to the year prior to involvement in the ERDF co-funded projects (thus we compare performance in the periods *t*, *t*+1 and *t*+2 with respect to *t*–1 to account for differences in initial values). Table 4 reports DiD estimators for all six different matching methods.

Table 4. Difference-in-difference estimators (DiD) for various methods of matching

Indicator	Period	1 nearest neighbour	2 nearest neighbours	5 nearest neighbours	1 nearest neighbour with caliper	2 nearest neighbours with caliper	5 nearest neighbours with caliper
		(1)	(2)	(3)	(4)	(5)	(6)
Log of TFP	*t*	-0.013	-0.018	-0.017	-0.015	-0.027	-0.026
	t+1	0.063	0.060	0.057	0.070	0.059	0.056
	t+2	0.199**	0.160**	0.148**	0.202**	0.167*	0.162***
Log of labour productivity	*t*	0.005	-0.001	-0.004	0.003	-0.011	-0.015
	t+1	0.101	0.089	0.078	0.105	0.082	0.071
	t+2	0.244***	0.198**	0.183***	0.244**	0.193**	0.180***
Log of average wage	*t*	0.005	0.010	0.011	0.005	0.011	0.010
	t+1	0.055*	0.076**	0.065***	0.058	0.080***	0.065***
	t+2	0.063*	0.083**	0.077***	0.066	0.089***	0.081***
Log of capital to labour ratio	*t*	0.155***	0.147***	0.133***	0.156***	0.145***	0.131***
	t+1	0.272***	0.272***	0.259***	0.275***	0.268***	0.252***
	t+2	0.380***	0.401***	0.361***	0.379***	0.394***	0.349***
Log of employment	*t*	0.058*	0.072***	0.069***	0.058*	0.075***	0.070**
	t+1	0.099**	0.123***	0.118***	0.098**	0.128***	0.124***
	t+2	0.137***	0.172***	0.164***	0.137***	0.182***	0.175***
Log of turnover	*t*	0.073*	0.080**	0.075***	0.076**	0.085**	0.075**
	t+1	0.161***	0.181***	0.158***	0.167***	0.187***	0.159***
	t+2	0.242***	0.261***	0.242***	0.245***	0.272***	0.249***
Exports to turnover ratio	*t*	0.006	0.004	0.002	0.006	0.005	0.005
	t+1	0.011	0.008	0.013	0.012	0.009	0.012
	t+2	0.014	0.007	0.013	0.016	0.011	0.014

Source: CSB, Latvijas Banka, authors' calculations.
Notes: *(**)[***] denotes significance at 0.1(0.05)[0.01] level. Caliper set to 0.05 in columns (4)–(6). To find the statistical significance of DiD estimators we use bootstrap procedure with 250 replications.

From Table 4 it is evident that companies that participate in ERDF co-funded activities raise their employment and capital (the latter at even higher rate, so that there is an increase in capital-to-labour ratio). These indicators start growing soon after firms embark on projects and keep on growing until *t*+2. Firms participating in ERDF co-funded projects increase their size (number of employees) by approximately 14–18% in three years comparing with control group's firms, while their capital-to-labour ratio increases by 35–40%. Increasing input allows ERDF beneficiaries expanding their

output and hence turnover in three years by around 25–27% in comparison to non-beneficiaries.

However, growing capital-to-labour ratio does not translate into higher TFP and labour productivity immediately. The estimated effect on TFP and labour productivity is close to zero in the first period and is positive, but insignificant, in the second period. Productivity gains appear positive and statistically significant only in the third period after launching a project. Table 4 indicates that labour productivity of participating companies grows by 18–24% faster compared to non-participating counterparts. Higher labour productivity also pushes compensation of employees up as treated firms increase nominal wage by 5–8% in two years after starting an ERDF co-funded project.

The immediate positive effect on capital endowment without a concomitant rise in firm's productivity is *prima facie* surprising. This is possible only if newly installed capital is not fully utilized in the first two periods. Low capital utilisation after its instalment may be a sign of the lack of necessary knowledge and experience of using the acquired capital. Alternatively, it may also signal that firms lack an access to wider markets to realize their full potential. To this end the estimation results also suggest that there is no positive effect on exports-to-turnover ratio, implying that firms do not expand their involvement in the global market to the extent necessary to fully utilize new capital despite the fact that several ERDF co-funded activities are explicitly aimed at exports promotion.

6.1.4. *Heterogeneity of the treatment effects*

It is conceivable that the estimated effects exhibit heterogenous patterns across firms, regions and projects. Therefore, in this section we examine whether the above reported DiD estimates vary with different characteristics of firms and projects. To this end we run cross-sectional regressions for DiD estimators in period t+2 for seven different firm performance indicators: TFP, labour productivity, wage level, capital-to-labour ratio, employment, turnover and exports-to-turnover ratio (see Table 5).

Control variables are divided into three categories. First, initial levels of firm performance indicators are considered. DiD estimators for both TFP and labour productivity appear larger for initially less productive and larger firms, i.e. these firms benefit from participation in ERDF co-funded projects to a larger extent than more productive and smaller firms. The effect on capital-to-labour ratio is found to be larger for firms with smaller capital-to-labour ratio, while the effect on employment is higher for initially more productive and smaller firms. Second, regional aspect is addressed by including dummies for geographical areas where projects are implemented. Interestingly, neither of the regional dummies included appears statistically significant which implies that productivity gains or employment increases are similar across the country. Finally, the last aspect of heterogeneity considered relates to activity. We would expect larger heterogeneity of DiD estimates across different ERDF co-funded activities than the one identified in the regressions. The effect on wages is lower for projects in the activity *Science and innovation*, presumable reflecting the requirement that the granted resources in this activity should not be spent to boost personnel salaries.

What is also somewhat puzzling is the absence of any effect on exports-to-turnover ratio. We have already shown that launching an ERDF co-funded project does not result in firms becoming more internationally oriented. However we would expect that this is merely an average estimate and exporting gains might be more visible in the case of

activities explicitly aimed at exporting promotion, such as direct marketing activities in the global market. Unfortunately, this assumption has not been empirically confirmed.

Table 5. Factors affecting difference-in-difference estimators in the period t+2 (DiD, 2 nearest neighbours with caliper of 0.05)

Variables	Difference-in-difference estimators (DiD) of:						
	TFP	Labour productivity	Wage	Capital to labour	Employment	Turnover	Exports to turnover
Initial productivity (log of TFP)	-0.583***	-0.561***	-0.041	0.105	0.097**	-0.097*	0.023
Initial size (log of employment)	0.291***	0.256***	0.055	-0.083	-0.134*	-0.026	-0.023
Age	-0.015	-0.014	-0.011*	-0.001	-0.006	-0.011	0.000
Initial capital to labour ratio	-0.009	-0.032	-0.018	-0.245***	0.038	0.055	-0.010
Initial exports-to-turnover ratio	0.240	0.154	-0.059	-0.260	0.203	0.187	-0.111
Risk of the project	-0.030	-0.022	-0.001	-0.056	-0.034	0.044	-0.038
Size of the project	0.021	0.016	0.015	0.001	-0.002	0.075	-0.009
Riga	-0.411	-0.382	-0.085	0.068	0.221	0.367	0.028
Riga region	-0.057	0.060	-0.068	0.231	0.013	0.026	0.048
Kurzeme	-0.054	-0.026	-0.107	-0.012	-0.077	0.035	0.050
Latgale	0.354	0.504	-0.001	0.400	-0.065	0.167	0.114
Vidzeme	0.002	-0.079	-0.056	0.009	-0.010	0.142	-0.008
Zemgale	-0.082	0.046	-0.049	0.529	-0.173	0.091	0.039
Science and innovation	-0.170	-0.010	-0.263*	-0.014	-0.110	-0.437	-0.028
Entrepreneurship support	0.139	0.287	0.040	0.138	-0.240	-0.202	0.067
Exporting promotion	-0.126	-0.531	-0.065	-1.522	0.131	0.298	0.039
Environment protection	0.109	-0.100	-0.108	-1.262*	0.249	-0.099	0.023
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic sector effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	362	362	362	362	362	362	362
R^2	0.343	0.329	0.113	0.254	0.160	0.132	0.088

Source: CSB, Latvijas Banka, authors' calculations.
Notes: *(**)[***] denotes significance at 0.1(0.05)[0.01] level. Dependent variables are difference-in-difference estimators in *t*+2 when matching is performed with 2 nearest neighbours with a caliper = 0.05 (column 5 in Table 4).

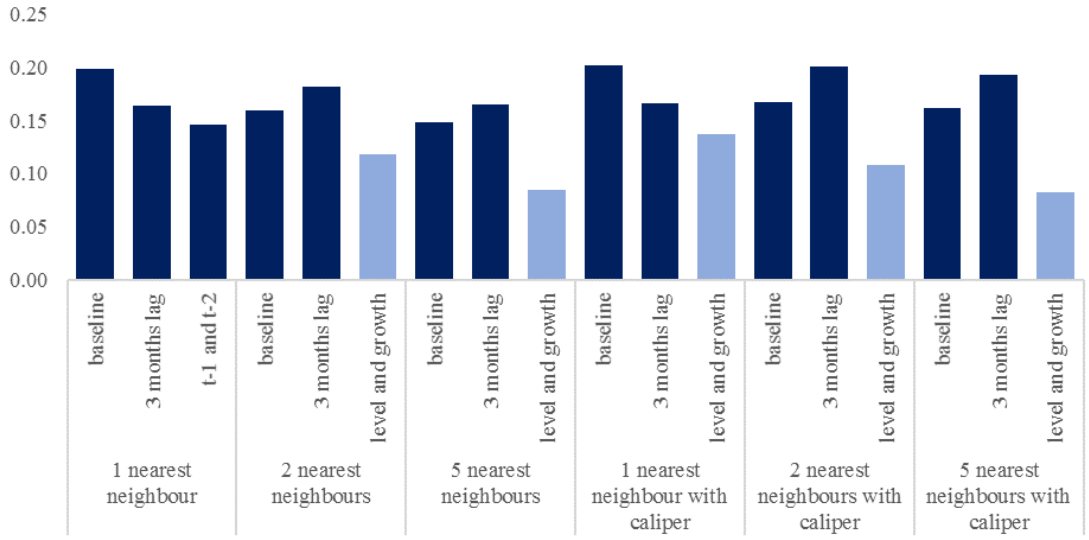
6.1.5. *Robustness section*

Finally we perform two robustness checks of the above DiD estimates. First, we consider timing of a project launch. When a firm embarks on an ERDF co-funded project closer to the end of a year, it may not be able to start reaping the benefits until at least the beginning of the next year. In such a case looking at the outcome in the same year *t* when a firm launches a project may be misleading. Therefore we perform an alternative matching of those ERDF beneficiaries that start a project during the last three months of a year with non-beneficiaries in the next year and gauge their relative performance considering the next year as year *t*. The quality of matching appears satisfactory, and the results of DiD estimation confirm our baseline estimation results (see Figure 2 for the effect on TFP and Table A3 in the Appendix for a broader range of results).

Another robustness check is related to the possibility that for a treated and a control firm may have similar initial level of productivity they still may have been different in terms of productivity growth. If a treated firm had experienced a more pronounced productivity growth in the past and occasionally caught up a control firm in period *t*–1, it should not come as a surprise that in the future it's productivity grows faster with productivity level eventually outpacing that of a control firm. To account for such a scenario we search for nearest neighbours that are similar in terms of productivity in both year *t*–1 and year *t*–2 so that at least in year *t*–1 they experienced similar

productivity growth. The DiD estimates suggest that productivity gains become smaller and their significance weaker, suggesting that our previously identified productivity gains in the third year may be the result of the selection bias not properly addressed by the chosen matching procedure (see Figure 2 and Table A4 in the Appendix). The estimation results of cross-sectional regressions for DiD estimators are broadly in line with the baseline and therefore are not reported for the sake of brevity.

Figure 2. Comparison of DiD estimators for TFP in period *t*+2 across different matching strategies and selections of control firms



Source: CSB, Latvijas Banka, authors' calculations.
Notes: Light columns represent insignificant estimates (not significant at 0.1 level). The first column refers to the baseline DiD estimator for TFP in *t*+2 ("baseline"), the second – to the DiD estimator that analyses performance of firms launching a project during the last 3 months of a year starting from the following, rather than the same, year ("3 months lag"), and the third column – refers to the DiD estimator that is based on matching that considers both initial level of TFP and its initial growth ("level and growth").

6.2. **Assessing the impact of investment financing source on firm performance**

Despite the no-crowding out requirement for receiving the EU funding, it was shown by Ederveen et al. (2003) that it still to a certain degree replaces the private one. Therefore, it is useful to analyse the impact of the EU funding on firm performance in comparison to private funding. In this subsection, we investigate whether the source of investments matters for company's further performance. To the best of our knowledge it is a first such attempt to compare the effect of both funding sources on firm performance, though there are some studies comparing the effect of different sources of spending on R&D and innovation (including the EU support).[20]

To answer the question posed we made some adjustments to our matching procedure. More specifically, we ensured that a paired control firm has experienced a similar increase in capital-to-labour ratio (rough proxy for similar investments) as a treated firm during the three-year period (comparing *t*+2 with *t*–1). Thus, again we look at

[20] For example, Czarnitzki and Lopes Bento (2014) look at the effects of national subsidies for innovation in Germany compared to, or in combination with, the effects of European subsidies on innovation and R&D intensity. The study finds that EU subsidies have smaller impact on firms' sales.

relative performance of similar companies (ERDF beneficiaries and non-beneficiaries) where this similarity also involves magnitudes of investments made.

Technically, this is done by modifying nearest-neighbour matching described in equation (3). Now the control firm *j* is chosen based on the following criteria:

$$\lambda > \left|P_{i,k,g,t} - P_{j,k,g,t}\right| = \min_{j \in \{eu_{j,k,g,t}=0\}} \left(\left|P_{i,k,g,t} - P_{j,k,g,t}\right|\right). \quad (9)$$

where $P_{i,k,g,t}$ denotes the predicted probability of receiving ERDF funding at time *t* for a firm *i* in sector *k* and in capital-to-labour growth group *g*. While the capital-to-labour ratio growth over three years is a continuous variable, we follow Iacus et al. (2012) and classify firms into several groups. We apply two strategies here: first, firms are classified into 5 groups according to the quintiles of the capital-to-labour ratio growth distribution; second, firms are classified into 10 groups according to the deciles of the same distribution. Afterwards, the nearest-neighbour matching occurs within a specified year, NACE sector and capital-to-labour growth group.

Table 6. Quality of matching for various methods

Variables	Difference in means of characteristics of treated and control companies (%) using various methods of matching				
	Unmatched	2 nearest neighbours, 5 groups	2 nearest neighbours, 5 groups, caliper	2 nearest neighbours, 10 groups	2 nearest neighbours, 10 groups, caliper
	(1)	(2)	(3)	(4)	(5)
Log of labour productivity	39.6***	8.8	3.0	11.3	5.5
Log of labour productivity square	38.1***	12.0*	7.6	13.5*	8.6
Age	19.9***	2.3	-3.5	3.5	-5.8
Age square	22.0***	2.6	-3.8	4.3	-5.7
Log of employment	118.5***	25.9***	11.6	38.1***	19.1**
Log of employment square	106.6***	32.7***	15.2*	43.1***	21.3**
Log of capital to labour ratio	29.7***	11.6*	9.4	12.1*	10.1
Log of capital to labour ratio square	7.9	8.6	4.8	8.6	5.0
Liquidity ratio	-6.1	-1.7	0.0	-7.3	-3.5
Indebtedness ratio	-2.9	-0.6	-0.7	-0.5	-0.2
Exports of goods to turnover	75.3***	10.0	-8.8	20.3**	-2.7
Exports of services to turnover	8.8*	-9.3	-11.6	-1.3	-3.7
Owner from OECD countries (dummy)	23.6***	8.0	6.0	4.1	-3.1
Owner from non-OECD countries (dummy)	14.8***	7.2	3.5	10.5	-4.9
Share of employees with EU funds experience	7.4	-2.2	-2.3	2.1	-0.4
Share of managers with EU funds experience	15.6***	0.6	3.6	5.6	1.3
Growth of capital-to-labour ratio (*t*+2 over *t*–1)	39.6***	2.6	3.5	1.8	2.8
Number of treated		382	339	376	326
Number of control		670	596	668	570

Source: CSB, Latvijas Banka, authors' calculations.
Notes: *(**)[***] denotes significance at 0.1(0.05)[0.01] level. Caliper set to 0.05 in columns (3), (5).

Table 6 reports quality assessment for this modified matching strategy. It can be observed, that matching over the same year, sector and capital-to-labour growth rate is rather restrictive, since the number of available controls is scarce. That is why the quality of matching is lower compared with Table 3, especially with respect to the initial number of employees, capital-to-labour ratio and exports. However, using caliper of 0.05, although reducing the number of observations by around 10%, improves the quality significantly, especially for the case of 5 groups of capital growth. It is important that an increase in capital-to-labour ratio over the three years period for treated firms is

not statistically significantly different from that for non-participating control firms,[21] thus all differences in firms performance should be attributed to the difference between EU funding and private financing, rather than to the magnitude of undertaken investments.

DiD estimators displayed in Table 7 show that keeping investment constant, we do not observe large differences in the impact estimates of ERDF funding versus private financing. If we compare productivity performance, ERDF co-funded projects result in a larger increase in labour productivity and TFP in the third year, however this difference is not statistically significant across all matching strategies.

The only striking feature of the EU Regional support program appears in the effect on employment: participation in ERDF co-funded projects leads to a significantly larger increase in the number of employees compared to private funding (by around 20% after three years). This might be related to the assessment process for participation in ERDF co-funded activities if firms with a potential to increase labour and turnover have a preference. There is also limited evidence of a higher increase of the wage rate for ERDF beneficiaries.

Table 7. Difference-in-difference estimators (DiD) for various methods of matching

Indicator	Period	2 nearest neighbours, 5 groups	2 nearest neighbours, 5 groups, caliper	2 nearest neighbours, 10 groups	2 nearest neighbours, 10 groups, caliper
		(1)	(2)	(3)	(4)
Log of TFP	*t*	-0.026	-0.031	-0.033	-0.038
	t+1	0.056	0.085	0.050	0.047
	t+2	0.157**	0.192**	0.114	0.116
Log of labour productivity	*t*	-0.051	-0.054	-0.048	-0.042
	t+1	0.012	0.039	0.011	0.015
	t+2	0.100	0.136	0.078	0.087
Log of average wage	*t*	-0.006	-0.005	0.007	0.010
	t+1	0.056*	0.064*	0.044	0.057
	t+2	0.072**	0.088**	0.049	0.056
Log of capital to labour ratio	*t*	0.005	0.013	0.016	0.024
	t+1	0.007	0.029	0.001	0.014
	t+2	0.031	0.042	0.021	0.033
Log of employment	*t*	0.105***	0.103***	0.096***	0.091***
	t+1	0.157***	0.154***	0.158***	0.151***
	t+2	0.218***	0.219***	0.196***	0.195***
Log of turnover	*t*	0.085**	0.082**	0.077**	0.072**
	t+1	0.179***	0.187***	0.150***	0.136***
	t+2	0.255***	0.261***	0.195***	0.178***
Exports to turnover ratio	*t*	0.006	0.009	0.012	0.012
	t+1	0.011	0.014	0.024*	0.026*
	t+2	0.021	0.028*	0.028**	0.034**

Source: CSB, Latvijas Banka, authors' calculations

Notes: *(**)[***] denotes significance at 0.1(0.05)[0.01] level. Caliper set to 0.05 in columns (2), (4). To find the statistical significance of DiD estimators we use bootstrap procedure with 250 replications.

Private financing of capital acquisition usually comes from two alternative sources: own resources and loans from credit institutions. Therefore we also estimate the effect of EU funding vis-à-vis these two sources separately. To capture the case of loans treated ERDF beneficiaries are matched with those ERDF non-beneficiaries, whose

[21] Although it is not reported in Table 3 treated and control firms were significantly different in terms of capital-to-labour growth before, results are available upon request.

capital increase is concomitant to an increase in firm's stock of long-term debt (over the same period of time) at the amount of at least 50% of acquired capital value.[22] To compare ERDF beneficiaries with those non-beneficiaries that predominantly cover acquired capital from own resources, treated firms are matched with those firms whose capital-to labour ratio increase is comparable but whose indebtedness increase is below the 50% threshold.

Table 8. Difference-in-difference estimators (DiD) for various sources of capital financing

Indicator	Period	ERDF financing vs predominantly loans	ERDF financing vs predominantly own resources
		(1)	(2)
Log of TFP	*t*	0.027	0.003
	t+1	0.043	0.063
	t+2	0.124	0.156*
Log of labour productivity	*t*	0.002	-0.008
	t+1	-0.014	0.035
	t+2	0.064	0.110
Log of average wage	*t*	-0.000	-0.009
	t+1	0.051	0.046
	t+2	0.074	0.070**
Log of capital to labour ratio	*t*	0.044	0.052
	t+1	0.069	0.034
	t+2	0.083*	0.002
Log of employment	*t*	0.127***	0.090***
	t+1	0.216***	0.132***
	t+2	0.294***	0.202***
Log of turnover	*t*	0.142**	0.090**
	t+1	0.239***	0.158***
	t+2	0.315***	0.240***
Exports to turnover ratio	*t*	0.020	0.028***
	t+1	0.021	0.035**
	t+2	0.022	0.039**
Number of treated		276	322
Number of control		411	575

Source: CSB, Latvijas Banka, authors' calculations.
Notes: *(**)[***] denotes significance at 0.1(0.05)[0.01] level. Caliper set to 0.05, 2 nearest neighbours, 5 groups of capital-to-labour growth. To find the statistical significance of DiD estimators we use bootstrap procedure with 250 replications.

Table 8 shows the DiD estimation results for the case when firms are classified into 5 groups according to the quintiles of the capital-to-labour ratio growth distribution and a caliper is set at 0.05, as this matching strategy entails better quality.[23] No any remarkable differences between these two cases are uncovered, apart from the fact that the impact on the increase of exports-to-turnover ratio appears to be statistically significant when investments are financed by ERDF rather than own resources. There is also an evidence (although with a weak significance) of productivity and wage improvements in this case.

7. CONCLUSIONS

This paper examines the casual effect of participating in EU co-funded projects on firm performance using rich dataset of Latvian firms. The analysis considers ERDF

[22] We do not know for sure whether a firm took a loan to finance capital acquisition or for any other purpose. We make this assumption as the data on the source of investment financing are not available.
[23] Results are available upon request.

beneficiaries as this EU regional policy instrument is particularly fit to enhance competitiveness of private companies and therefore is in line with the goal of this paper.

To evaluate the impact of participation in the ERDF co-funded projects we employ propensity score matching approach, which is widely used in microeconometric research on the outcome of participation in various publicly sponsored programs. We find that participation in ERDF co-funded activities raises firm's capital-to-labour ratio and employment soon after the start of a project, while a positive effect on labour productivity takes a longer time to kick in. We also find that there is no statistically significant productivity premia associated with private versus public (ERDF) financing of investment projects, though in the latter case firms tend to increase the number of their employees more rapidly, presumably reflecting selection criteria for participation in ERDF co-funded projects. Finally, we show that the positive effect on TFP and labour productivity is more likely to materialize for companies that are bigger and less productive prior to participation in the EU supported programmes, while the effect on employment is larger for more productive and relatively smaller firms.

The immediate positive effect on capital endowment without a concomitant rise in firm's productivity is surprising. This is possible only if newly installed equipment or facilities are not fully utilized in the first two periods. Lags in acquired capital utilization may point at the presence of knowledge gaps, i.e. employees' lack of necessary skills to gain most from the installed capital. Alternatively, to attain the EU funding productivity premium, firms may need to considerably expand their production by spreading their sales outside the domestic market, which may not happen immediately.

When interpreting these results one should bear in mind that we consider a participation moment to occur in the year when a firm starts a project. However, in the case of long lasting projects taking years, firms may indeed be unable to reap their benefits until completion. As the end year of our dataset is 2014 we may still be unable to see the full effect of the financial framework 2007–2013. Moreover, firms that applied for the EU support in 2013 or 2014 are effectively out of our investigation. In the future, accumulating longer data series, would allow having more time between launching ERDF projects and their potential output to draw more precise conclusions regarding their effectiveness.

On the policy side, we see some room for improvements in the effectiveness of design and allocation of the EU funds depending on objectives pursued by policymakers. If the objective is to add more jobs and capital, authorities should presumably target more productive firms. However, it was shown that such firms might gain relatively less in terms of subsequent productivity performance. Policy activities that promote companies internationally would contribute to raising capital utilisation and therefore allow companies to benefit more from newly installed capital co-funded by the EU. To this end, the fact that participation in external promotion activities yields similar impact on subsequent exporting as participation in other ERDF co-funded programmes, where explicit promotion of exports is not considered as the main objective, is striking and might indicate that such activities should be better designed.

Since a positive effect on employment appears as a highly robust finding across various matching strategies, it would be interesting in future researches to analyse the origins of extra labour attracted. If labour comes from a pool of unemployed or inactive persons, ERDF projects improve national employment figures. However, if new

employees come from other enterprises, ERDF may have an adverse effect on allocation of labour.

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Appendix

Firm-level datasets used in the study

In this study, apart from the dataset containing information on EU co-financed projects, the following firm-level datasets are used:

Firms' indicators comprehensive database that contains records from companies' balance sheets and profit and loss statements as well as provides data on value added, number of employees, personnel costs, production value and the use of intermediate inputs. Data are collected on the basis of CSB annual statistical report "1-annual", "Complex report on activities" and reports to the State Revenue Service.

Goods external trade database that includes data on merchandise flows (exports and imports) where merchandise is classified according to the eight-digit Combined Nomenclature (CN8) classification. This database is based on data coming from two sources: INTRASTAT surveys for Latvia's trade with other EU member states and custom declarations for trade with countries outside the EU.

Services external trade database, collected by Latvijas Banka, provides data on export and import flows for all types of services apart from travel, construction, insurance and government services for which detailed firm-level information is not collected and other sources are used for the balance of payments purpose.

Firms' foreign assets and liabilities dataset, also collected by Latvijas Banka, provides information on external assets and liabilities of firms. This dataset allows detecting companies with direct foreign owners (including the country of origin of an owner).

Employer-employee data, provided by CSB and based on the State Revenue Service information from companies' social insurance tax declarations allows to track employees with an experience working on projects co-funded by the EU regional support instruments.

Table A1. Coefficients of the Cobb-Douglas production function

Sector	Coefficient before labour ($\hat{\beta}_1$)	Coefficient before capital ($\hat{\beta}_2$)	Number of observations
05 Mining of coal and lignite	0.669***	0.302***	718†
06 Extraction of crude petroleum	0.669***	0.302***	718†
07 Mining of metal ores	0.669***	0.302***	718†
08 Other mining and quarrying	0.668***	0.302***	711
09 Mining support service activities	0.669***	0.302***	718†
10 Manufacture of food products	0.611***	0.183***	2814
11 Manufacture of beverages	0.743***	0.392***	267
12 Manufacture of tobacco products	0.681***	0.197***	24406†
13 Manufacture of textiles	0.658***	0.172***	639
14 Manufacture of wearing apparel	0.894***	0.162***	1584
15 Manufacture of leather and related products	1.044***	0.129**	190
16 Manufacture of wood and products of wood and cork	0.502***	0.257***	4335
17 Manufacture of paper and paper products	0.638***	0.162**	389
18 Printing of reproduction of recorded media	0.785***	0.200***	1581
19 Manufacture of coke and refined petroleum products	0.681***	0.197***	24406†
20 Manufacture of chemicals and chemical products	0.629***	0.192***	656
21 Manufacture of basic pharmaceutical products	0.681***	0.197***	24406†
22 Manufacture of rubber and plastic products	0.843***	0.171***	975
23 Manufacture of other non-metallic mineral products	0.519***	0.157***	1242
24 Manufacture of basic metals	0.681***	0.197***	24406†

25 Manufacture of fabricated metal products	0.729***	0.207***	2796
26 Manufacture of computer, electronic and optical products	0.719***	0.182***	474
27 Manufacture of electrical equipment	0.824***	0.177***	329
28 Manufacture of machinery and equipment n.e.c.	0.629***	0.238***	680
29 Manufacture of motor vehicles, trailers and semi-trailers	0.681***	0.197***	24406†
30 Manufacture of other transport equipment	0.681***	0.197***	24406†
31 Manufacture of furniture	0.633***	0.205***	2011
32 Other manufacturing	0.861***	0.155***	880
33 Repair and installation of machinery and equipment	0.774***	0.180***	2005
35 Electricity, gas, steam and air conditioning supply	0.284***	0.109**	1503
36 Water collection, treatment and supply	0.416***	0.181***	2717†
37 Sewerage	0.728***	0.020	247
38 Waste collection, treatment and disposal activities	0.695***	0.210***	727
39 Remediation activities and other waste management services	0.416***	0.181***	2717†
41 Construction of buildings	0.543***	0.170***	4873
42 Civil engineering	0.705***	0.247***	1855
43 Specialised construction activities	0.766***	0.204***	10621
45 Wholesale and retail trade and repair of motor vehicles	0.695***	0.146***	10455
46 Wholesale trade, except of motor vehicles and motorcycles	0.518***	0.163***	28831
47 Retail trade, except of motor vehicles and motorcycles	0.687***	0.112***	30926
49 Land transport and transport via pipelines	0.535***	0.188***	11809
50 Water transport	0.680***	0.166***	18240†
51 Air transport	0.680***	0.166***	18240†
52 Warehousing and support activities for transportation	0.773***	0.157***	6004
53 Postal and courier activities	0.680***	0.166***	18240†
55 Accommodation	0.550***	0.194***	2014
56 Food and beverage service activities	0.693***	0.134***	5653
58 Publishing activities	0.928***	0.126***	1487
59 Video programme production, sound recording and music publishing	0.914***	0.181***	665
60 Programming and broadcasting activities	0.916***	0.201***	9448†
61 Telecommunications	0.846***	0.243***	1320
62 Computer programming, consultancy and related activities	0.972***	0.188***	4170
63 Information service activities	0.991***	0.221***	1410
68 Real estate activities	0.500***	0.093***	16264
69 Legal and accounting activities	0.919***	0.126***	10305
70 Activities of head offices; management consultancy activities	0.846***	0.144***	3816
71 Architectural and engineering activities	0.859***	0.201***	5143
72 Scientific research and development	0.703***	0.061	377
73 Advertising and market research	0.847***	0.182***	4866
74 Other professional, scientific and technical activities	0.736***	0.195***	2445
75 Veterinary activities	0.824***	0.161***	27344†
77 Rental and leasing activities	0.525***	0.226***	2465
78 Employment activities	0.894***	0.236***	712
79 Travel agency, tour operator and related activities	0.954***	0.124***	1764
80 Security and investigation activities	0.911***	0.101***	1214
81 Services to buildings and landscape activities	0.881***	0.110***	1845
82 Office administrative, office support and other activities	0.874***	0.061	770

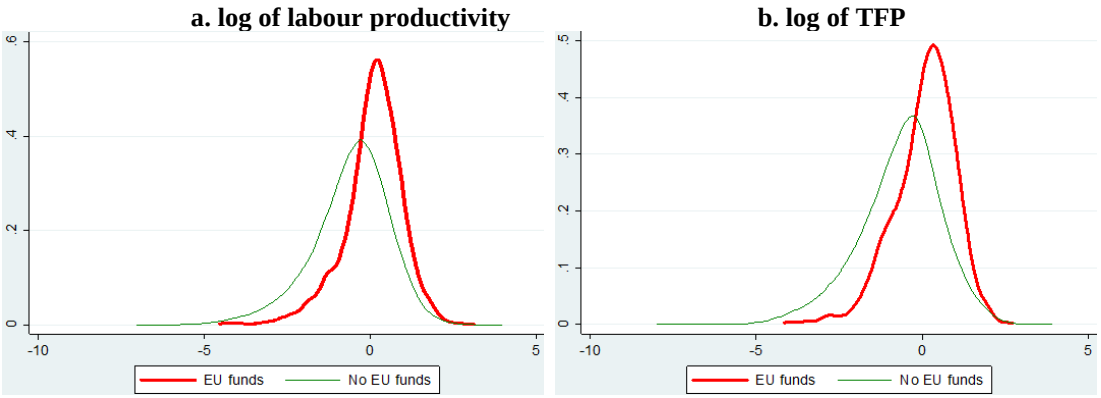
Source: CSB, Latvijas Banka, authors' calculations.
Notes: *(**)[***] denotes significance at 0.1(0.05)[0.01] level. † reflects that estimates were made on a broad macroeconomic sector level.

Table A2. Comparison of ERDF beneficiaries and non-beneficiaries

Firm characteristics	ERDF beneficiaries (N = 994)		ERDF non-beneficiaries (N = 547'470)	
	Mean	Standard deviation	Mean	Standard deviation
Age	9.04	6.67	7.18	5.91
Number of employees	59.85	167.05	10.64	76.11
Log of relative labour productivity*	0.61	1.12	0.00	1.30
Log of relative TFP*	0.71	1.12	0.00	1.24
Ln of relative capital-to-labour ratio*	0.80	1.88	0.00	2.05
Exporter of goods and/or services (dummy)	0.43	0.50	0.07	0.26
Exports of goods to turnover	0.17	0.29	0.02	0.10
Exports of services to turnover	0.02	0.13	0.01	0.07

* relative to average in sector and year.

Figure A1. Distribution of productivity for firms obtaining ERDF funding, comparing with other firms



Source: CSB, Latvijas Banka, authors' calculations.

Table A3. Difference-in-difference estimators (DiD) for various methods of matching (addressing the problem of the end of a year)

Indicator	Period	1 nearest neighbour	2 nearest neighbours	5 nearest neighbours	1 nearest neighbour with caliper	2 nearest neighbours with caliper	5 nearest neighbours with caliper
		(1)	(2)	(3)	(4)	(5)	(6)
Log of TFP	*t*	-0.033	-0.018	0.014	-0.037	-0.019	0.013
	t+1	-0.002	0.043	0.071	0.005	0.051	0.083
	t+2	0.164*	0.182**	0.165***	0.166*	0.201***	0.193***
Log of labour productivity	*t*	-0.007	0.001	0.025	-0.014	-0.005	0.019
	t+1	0.020	0.073	0.098*	0.018	0.074	0.099
	t+2	0.170*	0.211***	0.197***	0.166*	0.220***	0.210***
Log of average wage	*t*	0.035	0.034	0.010	0.031	0.030	0.008
	t+1	0.091***	0.091***	0.063***	0.088**	0.090***	0.062**
	t+2	0.079**	0.101***	0.085***	0.075*	0.102***	0.088***
Log of capital to labour ratio	*t*	0.150***	0.133***	0.126***	0.132**	0.118**	0.106**
	t+1	0.216***	0.238***	0.258***	0.192**	0.225***	0.234***
	t+2	0.260***	0.297***	0.334***	0.234***	0.282***	0.311***
Log of employment	*t*	0.099***	0.091***	0.094***	0.098***	0.091***	0.096***
	t+1	0.170***	0.135***	0.130***	0.173***	0.134***	0.136***
	t+2	0.237***	0.182***	0.184***	0.239***	0.184***	0.190***
Log of turnover	*t*	0.085**	0.092***	0.090***	0.084**	0.093***	0.089***
	t+1	0.148***	0.155***	0.150***	0.153***	0.159***	0.156***
	t+2	0.254***	0.244***	0.233***	0.256***	0.252***	0.243***
Exports to turnover ratio	*t*	0.008	0.017	0.013	0.009	0.018*	0.015*
	t+1	0.006	0.018	0.018	0.008	0.019	0.019
	t+2	0.002	0.011	0.013	0.004	0.012	0.014

Source: CSB, Latvijas Banka, authors' calculations.
Notes: *(**)[***] denotes significance at 0.1(0.05)[0.01] level. Caliper set to 0.05 in columns (4)–(6). To find the statistical significance of DiD estimators we use bootstrap procedure with 250 replications.

Table A4. Difference-in-difference estimators (DiD) for various methods of matching (matching with firms having similar labour productivity in both *t*–1 and *t*–2)

Indicator	Period	1 nearest neighbour	2 nearest neighbours	5 nearest neighbours	1 nearest neighbour with caliper	2 nearest neighbours with caliper	5 nearest neighbours with caliper
		(1)	(2)	(3)	(4)	(5)	(6)
Log of TFP	*t*	0.029	-0.023	0.005	0.016	-0.035	-0.003
	t+1	0.070	0.057	0.062	0.062	0.042	0.047
	t+2	0.146*	0.118	0.085	0.137	0.108	0.082
Log of labour productivity	*t*	0.039	-0.015	0.020	0.028	-0.026	0.013
	t+1	0.101	0.079	0.091	0.092	0.065	0.078
	t+2	0.152*	0.139*	0.115*	0.144	0.124	0.108
Log of average wage	*t*	0.002	0.010	0.008	0.002	0.010	0.010
	t+1	0.066*	0.064**	0.062**	0.062*	0.061**	0.059**
	t+2	0.088**	0.088**	0.083***	0.086**	0.088***	0.085***
Log of capital to labour ratio	*t*	0.128**	0.115***	0.133***	0.132***	0.115**	0.136***
	t+1	0.264***	0.258***	0.270***	0.272***	0.260***	0.270***
	t+2	0.329***	0.347***	0.353***	0.341***	0.351***	0.357***
Log of employment	*t*	0.074**	0.065***	0.058***	0.074**	0.066**	0.057**
	t+1	0.141***	0.122***	0.110***	0.140***	0.127***	0.115***
	t+2	0.229***	0.181***	0.160***	0.229***	0.195***	0.169***
Log of turnover	*t*	0.081**	0.073**	0.071**	0.078*	0.070**	0.064**
	t+1	0.172***	0.159***	0.145***	0.168***	0.151***	0.135***
	t+2	0.269***	0.234***	0.212***	0.265***	0.231***	0.203***
Exports to turnover ratio	*t*	0.012	0.009	0.006	0.015	0.011	0.010
	t+1	0.034**	0.027*	0.018	0.036**	0.029	0.021*
	t+2	0.043***	0.029**	0.023*	0.045**	0.032*	0.025**

Source: CSB, Latvijas Banka, authors' calculations.

Notes: *(**)[***] denotes significance at 0.1(0.05)[0.01] level. Caliper set to 0.05 in columns (4)–(6). To find the statistical significance of DiD estimators we use bootstrap procedure with 250 replications.