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Effect of the Service Directive on Wholesale and  
Retail Companies: Diff in Diff in Diff Evidence

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## **Abstract**

### **Vojtěch Olbrecht: Effect of the Service Directive on Wholesale and Retail Companies: Diff in Diff in Diff Evidence**

The Service Directive puts into motion the free movement of service, one of the milestones of the Single Market of the European Union. Though very ambitious at its draft, several adjustments have been made and it is argued whether the final Directive is helpful at all. This article aims to answer the question by focusing on productivity of affected companies with use of two distinct control groups and employing Difference-in-difference-in-difference design on firm-level data. The article finds that the Service Directive significantly increased productivity of companies though the results cannot be labelled as profoundly causal as is further discussed in the article.

## **Key words**

Service Directive, European Union, Difference-in-Difference-in-Difference, Law and Economics

**JEL:** K20, K33, O12, O24

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## **1 Introduction**

European Union has achieved many successes in the area of Single Market, but up to the recent years, those remained more or less limited to the free movement of goods (Dettmer, 2015) as those are easier to grasp and to be dealt with in several other issues (e.g. they are returnable and there is no proximity needed). Free movement of services, the second element of the Single Market, was left out of the practical implementation of the initiative, up to the beginning of the 21st century when heterogeneous environment of services started being noticed.

The Service Directive is said to be the most controversial piece of legislation in years (Timmerman, 2009) with potential large benefits in the area of freedom of movement. After several years of negotiating, the agreed Directive was much less ambitious and influential and therefore kept space for further debates on whether it will be useful at all. This article tries to add to this debate by empirical ex post evaluation of the effects of the Directive on the productivity of companies.

The goal of the paper is to provide evidence of the relationship between productivity and implementation of the Service Directive. The paper further tries to eliminate confounding effects in order to distinguish the Service Directive's pure effect. This article complements existing literature about the Service Directive's effects that is focused mainly on ex ante estimations and/or effect on trade. It tries to provide the best available evidence yet with regards to productivity. The causal explanation is hard to achieve, particularly in areas of political decisions and real-world data, but the article tries to approximate to the causal explanation as much as possible though there are still several issues that need to be considered.

The article is structured as follows: Section 2, 3 and 4 deal with a literature review of current research mainly focused on description of the Directive from the law point of view and with estimates of welfare effects. Section 5 presents research strategy developed by the article, how it deals with several causality issues and tries to implement an approach that will provide the best possible causal explanation. Section 6 presents results and section 7 concludes.

## **2 Theoretical Framework**

The reason for the importance to focus on the productivity of the service sector is argued by potential lost gains from underperformance of the EU service sector relative to that of the US, particularly at the Wholesale and Retail industry, where impact is particularly important for the economy as a whole due to the sector being intermediary for other industries. This underperformance of the EU may be caused

by low innovation, less developed technologies and robust regulation. Compared to the US, growth in the EU is much slower as well (Delgado, 2006).

Underperformance of the EU service industry in view of productivity can be – at least partially – attributed to low levels of competition. Competition can be lowered by legislation by at least two ways: First, it can root in legislation focused on addressing market failures such as asymmetric information, etc. (e.g. by imposing regulated profession provision) (Corugedo & Ruiz, 2014). Second, by creating (even unwillingly) a heterogeneous legal environment, where producers or providers have to follow different legislation in different countries, which increases their transaction costs and thus decreases (foreign) competition.

In services sectors this is particularly a problem because of the service specifics such as that providers have to work within the country of delivery and thus need to have required documentation, their product is intangible and its delivery requires proximity of both provider and receiver, etc. These and more issues are sources of relatively low volumes of trade within services industries (less than 5%) even though they account for a large share of product and growth (De Bruijn et al., 2006). The Service Directive tries to deal with the second source of low competition by harmonising legislation so that it provides a homogenous environment in all Member States – it tries to eliminate the problem of different standards, legislation, etc. in different Member States.

This article comes from an assumption that the ultimate goal of any legislation should be better-off citizens of a particular country or the Union. One way to raise benefits for citizens is by influencing their wellbeing, which is determined from a large part of wages or salaries received from companies. Therefore, the country or the Union should take care of companies and their competitiveness (which is partially determined by productivity), by which the wellbeing of their employees is influenced as well.

The Directive indeed should have two basic effects – an increase in trade and FDI and an increase in sectoral productivity that later translates into GDP (Monteagudo et al., 2012).

In a sense of the above, the declared goal of the Service Directive to increase trade and FDI is an intermediary goal in order to increase productivity and thus the wellbeing of citizens/employees. By increasing trade between Member States, the competition is supposed to rise, which should force companies to increase their competitiveness in order to achieve their business goals. One way how to increase competitiveness is to increase productivity of the company, therefore produce more with the same amount of resources or produce the same with fewer resources.

The effect of the Directive on product growth should be indirect via trade and FDI (Dettmer, 2015), or, more broadly speaking, the effect of liberalization on productivity should come through trade via economies of scale, specialisation, knowledge and technology diffusion (Badinger & Maydell, 2009, Frankel & Romer, 1999), imitation and organization spillovers (Monteagudo et al., 2012), improving allocation efficiency that force companies into improving their productivity (model implemented by De Bruijn et al., 2006), larger competition which lowers prices, increases productivity and supports efficient allocation (Dettmer, 2015). Overall, Corugedo and Ruiz (2014) call increased productivity due to increased competition a domestic transmission channel (larger competition leads to higher productivity).

The dynamic approach of productivity effects states that more competition associated with greater trade will force less competitive firms out of the market and the remaining will be more competitive and more productive than before (De Bruijn et al., 2006).

### **3 Development of the Service Directive**

The area of services was covered by Treaties (European Union, 1957, Art 3 Treaty of Rome), but there was not enough done in the practice up to the year 2004 (see e.g. European Commission, 2002) when the European Commission proposed legislation focusing on the free movement of services (European Commission, 2004). This legislation was very ambitious, but also very controversial, mainly because of the proposed country-of-origin principle (Timmerman, 2009), so after approximately 2 years of negotiations, the final version that has been agreed on was radically different, with fewer ambitions and controversies (Timmerman, 2009, Delgado, 2006).

The agreed Directive did not include the country-of-origin principle (but introduces freedom to provide services instead), incorporates a long list of exceptions and several others provisions (Dettmer, 2015, Timmerman, 2009) such as provisions about non-discrimination by country of establishment (Dettmer, 2015), and it is weak overall because it does not forbid restrictions on free movement, but rather suggest countries to re-evaluate them and allow only those that are in the general interest (Corugedo & Ruiz, 2014). According to Delgado (2006) the Directive mainly accounts for freedom of establishment of service providers, freedom of trade in services and minimal levels of consumer protection.

Still, the scope is very wide even in this reduced form, as the Service Directive covers 65% of services which account for 45% of European Union's GDP (Corugedo & Ruiz, 2014).

Potential positive effects of the Directive were questioned by those who argued against the Directive, or at least claimed that the Directive has been reduced substantially (within the 2 years of

compromising) and that there are no new elements (Timmerman, 2009). One of the largest arguments against the possible effect is that most of the elements laid down in the Directive are already implemented through case law (Rentrop, 2007). Supporters of the Directive oppose with the fact that the codification into secondary legislation will produce a legal base with general, proactive applicability (Timmerman, 2009) that is useful even though case law exists.

Even though the Service Directive establishes rules derived from case law, and new breakthrough elements were reduced, its provisions might help in removing obstacles and in administering free trade of services because it is broader than case law and easier to implement (Delgado, 2006).

The main goal of the Service Directive is the increase of intra-EU trade between Member States by removing its barriers (European Parliament, 2006). This goal of the Directive is achieved mainly through simplifying administration, enhancing the receiving side of contracts and fostering cooperation (European Parliament, 2006); another important issue involves single points of contact for foreign providers (De Bruijn et al., 2006).

In the Directive, there are still several controversial issues, e.g. legal uncertainty (vague formulations), inconsistent provisions and provisions that are already included in existing legislation and are therefore unnecessary (e.g. exclusion of non-economic services of general interest is duplicate because non-economic activities are not considered services by the Treaty and case law) (Timmerman, 2009).

Another existing problem is that there are still some countries that do not comply with obligations resulting from the Directive (e.g. in patents or the tourism sector) or do comply at the minimum level only, so some providers have to deal with double regulation or uncertainty about which legal system applies. The retail and wholesale sector itself is still affected by regulation of the protectionist and/or disproportionate nature and arbitrarily of decisions (e.g. economic needs tests in RO, AT, EL, NL, HU and partly in DE and ES) (European Commission, 2012).

Still, even though the negotiations reduced the scope and depth of the Directive and several problematic issues remain, the Directive was agreed on and Member States were supposed to implement it by the end of December 2009. The question arises whether the Directive was reduced so much that the final effect is null or whether the Directive can still influence companies and economies.

#### **4 Literature review**

There is vast literature concerning ex ante effects of the Service Directive, mainly focusing on trade, but also on other aspects of economies. Literature focuses mainly on the potential impact on intra-EU

trade and FDI, computing the general equilibrium and effects of the country-of-origin principle (Dettmer, 2015).

According to (De Bruijn et al., 2006), the potential gains from Service Directive should be around 0.2 to 0.4% of GDP and 0.3 to 0.7% of consumption. Trade increase should be 20-40%. The potential gains could have been even higher if the Directive had incorporated the country-of-origin principle, which was part of the first draft but was excluded subsequently.

Other estimates claim the effect of the Directive (freedom to provide services and freedom of establishment) on GDP to be 0.8% (the upper bound of the average effect is 1.6%) as being told in the first official evaluation of the Directive's impact and the most benefits should be captured within first five years of evaluation, but there are still possible additional gains from further liberalization led by individual Member States (another 0.6-2.6% of GDP). The impact of the Service Directive on individual states is estimated to be between 0.3 and 1.5% of GDP, depending on each Member State. The main effect is said to be the domestic effect, the increase of productivity because of the reduction of barriers. Simplification by Points of Single Contact accounts for 0.13% rise in GDP, also with potential of another rise by States initiative (Monteagudo et al., 2012). This article was cited in Report by European Commission (2013).

The only paper known to the author researching the ex post effects of the Directive focuses on effects of bilateral macroeconomic trade and uses dif-in-dif-in-dif research design. Dettmer (2015) calculates DD estimator where treatment variable is equal to one if two countries are members of EU and the time is after treatment occurred. In addition, the DDD estimator adds condition of whether the countries liberalized trade or not. Their results suggest that the trade among EU-15 states has been unaffected, but that there was increased flow from them to Eastern Europe, though author argue that there needs to be more time for effects to emerge.

Most previous studies quantifying economic effect of Service Directive were based on initial proposal including country-of-origin principle, which is was excluded. Also, previous papers do expect full implementation of the Directive or at least homogenous implementation across Member States (Monteagudo et al., 2012). This paper, on the other hand, assumes only the year of the main effect, but takes Directive as it was agreed on and implemented by Member States. Also, it uses microeconomic data and focused primarily on productivity, not trade.



## 5 Empirical strategy, Methods and Data

Service Directive's introduction was event that affected (and still affects) only some companies (though indirectly there might be effects due to vertical production chains) in the EU. The basic idea how to provide an evidence about the effect of Service Directive is by applying simple differences of post and pre implementation period, but this estimate would be biased because there will be other effects occurring in the same period as well.

One way to deal with this is to use control group and try to calculate difference in differences estimate (DD). From the difference estimator (suggested in previous paragraph) is subtracted the difference estimator of a control group and therefore, if there is something else affecting all companies, it should be excluded from the estimate. DD is an estimator generally used in experimental and quasi-experimental studies to overcome biases, though several assumptions are in place. One can do additional adjustment by using difference in difference in difference estimator (DDD) that uses another control group to cover confounding factors.

The data used in this article are individual (firm-level) data for companies from Europe operating mainly in Manufacturing and Wholesale and retail<sup>1</sup>, observed over 10 years (2004-2013) in unbalanced panel data structure obtained from Amadeus database (Bureau Van Dijk, 2015). Monetary values are in thousands of EUR, unless stated otherwise.

The treatment group are companies in Member States of the EU which are operating in the wholesale and retail industry (NACE Rev. 2 G sector; these are affected by the Service Directive). The subtraction of the post and pre-treatment (introduction of the Directive in 2009) period would produce a difference estimator and would create several problems with unaccounted effects.

Therefore, a control group is used. First there are companies that are in the EU but in different sectors (NACE Rev. 2 A, B and C sectors). This control group should account for effects that affected all companies in the EU (or at least in our sample) and would bias the difference estimate (e.g. EU proposes new legislation that benefits all companies no matter which sector or if a financial crisis occurs). Subtraction of their difference from the difference of the treatment group provides interesting evidence that in some situations (e.g. quasi-experiments) can be called causal.

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<sup>1</sup> More precisely, the data are for companies from A, B, C (control group), and G (treatment group) of NACE Rev. 2 classification in 44 countries of Europe (both Member States and non-member states of the EU).

The use of the second control group is important, because there might be effects affecting a particular industry (but not the others) that are not linked to the treatment. An example could be technology spillover or global industry-specific recession (e.g. technology bubble in 1999). The second control group consists of companies that are not in the EU but are operating in the same sector as the treatment group is, therefore are not affected by the legislation. The subtracted difference should decrease the bias caused by potential problems of the DD estimator.

To analyse effects of the Directive, regression analysis is used. The article employs a microeconomic panel data structure with fixed effects for companies, which are able to account for any unobserved time-invariant heterogeneity within the data (e.g. country, legal form, etc.), and fixed effects for years, which are able to account for any unobserved company-invariant heterogeneity (e.g. global issues, economic crises etc.). The estimation method is OLS.

The regression equation follows:

$$TFP_{it} = \alpha + \beta_1 Treatment_{it} + \beta_2 Labour_{it} + \beta_3 Capital_{it} + \beta_4 GDP_{it} + \sum_{n=5}^8 \beta_n control_{nit} + \sum_{n=9}^{14} \beta_n X_{nit} + \delta_i + \rho_t + \epsilon_{it}$$

where  $i$  is the number of the company,  $t$  is the time,  $Treatment$  is interaction of the EU/industry/time dummy (DDD estimator; 1 for EU=1, industry(G)=1, postperiod=1; 0 otherwise),  $Labour$  is the logarithm of the number of employees,  $Capital$  is the logarithm of denominated fixed assets,  $GDP$  is the logarithm of denominated GDP,  $control$  is the vector of control variables from financial analysis (liquidity, profitability, leverage, activity),  $X$  are dummies and their interaction accompanying the DDD estimator (EU, industry, time) and  $\alpha$ ,  $\delta$ ,  $\rho$ ,  $\epsilon$  are constant, company fixed effects, time fixed effects and error term respectively.

Data are further merged with country-data from Eurostat (Eurostat, 2016; unavailable data are replaced by EU(28) average), namely GDP as one of the control variables and inflation (Producer prices NACE Rev. 2 Section C) for denomination of values of other monetary variables to prices of 2010 (to control for inflation effects).

Outliers (values outside of the <1;99> percentile interval) are removed from the data to obtain more consistent results. In order to standardise the values, logarithmisation is used, but zero values are replaced with values near to zero ( $10^{-15}$ ) and logarithmisation is done through neglog transformation (Whittaker et al. 2005) so that negative values are taken into account as well.

The dependant variable is counted as in Goedhuys, Srholec, (2015):

$$TFP_{it} = (\ln Y_{it} - \overline{\ln Y}) - \left( \sum_m \frac{1}{2} (\omega_{itm} + \overline{\omega_m}) (\ln I_{itm} - \overline{\ln I_m}) \right)$$

where  $i$  is the number of the company,  $t$  is time,  $m$  is input,  $Y$  is value added (or turnover),  $\omega$  is the cost share of input,  $I$  is input and above lined are means of the overall sample. There is an exception that depreciation values are real data, not guesses as in Goedhuys, Srholec (2015). The advantage of the indicator considering both production factors and added value is that it is resistant to outsourcing and substitution of labour and capital.

Other independent variables are included in order to control for other effects that are time-variant and company-variant and therefore are not excluded by fixed effects or control groups. These are the basic variables Solow (1956) used (labour and capital – number of employees and fixed capital), GDP as the indicator of business cycle and one variable from each part of financial analysis: activity (turnover divided by assets), liquidity (current assets divided by current liabilities), profitability (profit before tax divided by assets) and leverage (shareholder funds divided by assets). There is no need to control for effects such as legal form, country of establishment, proximity to the sea, etc., as those should be accounted for by fixed effects.

The regression method itself is made to produce correlation results that are useful for prediction, but not for causality interpretations, which are the ones this article tries to make. Therefore, if not taken care of, the results of this article could reflect reverse causality, other cofounding effects, etc.

The first important step in reducing the bias is using panel data that cover both the time and cross-section dimension. Also, by using more than one time period in both pre and post treatment periods, the results tend to be more accurate. Another step is use of fixed effects that allow controlling for all unobserved heterogeneity that is time-invariant (e.g. country of establishment, industry, etc.) and company-invariant. The use of a proper research design is crucial in making causal inferences. This paper uses an upgrade of Difference-in-Difference and adds another control group in order to be able to cross out other confounding effects.

On the other hand, there are several problems that must be taken into account when interpreting the results – endogeneity and observational data are two of them which are considered to be the most significant (but not the only ones). Endogeneity of the treatment variable might cause a bias because legislators choose which industry will be affected by the legislation, and it is plausible to assume that they will aim to increase the trade (or productivity) at industry with lower values of trade (or

productivity). Therefore, pre-treatment performance affects treatment. The article uses observational real-world data that might be problematic for causal explanation. Observational data might also produce bias if there are some observations missing at a not-random pattern. The Amadeus database, the source of data, uses public registers of countries, but companies can choose whether they will publish their data or not (even where there is a statutory obligation to do so under threat of punishment). If there is not sufficient proof that data are missing at random, there might be a pattern of missing data that biases the estimates.

## **6 Results**

In order to discover a relation between variable of interest – implementation of the Service Directive – and depending variable – productivity – there are 2 steps needed:

Firstly, the productivity has to be quantified. Though this topic itself is debatable, there are ways of estimating what the firms' productivity is (productivity of labour, productivity of capital and total factor productivity). In order to observe the most consistent results, robustness tests will cover both partial productivities even though total factor productivity is still considered to be the most comprehensive.

Secondly, there has to be stated which year will be considered to be the year when the Service Directive started to influence companies. As there might be several effects and the main effect does not need to be in the same moment for all companies, there is a simplification needed that will consider 2009 as the most appropriate year of treatment, because the Directive was proposed in 2004, agreed on in 2006 and the deadline from Member States to incorporate its provisions into their legislation was stated as 27 December 2009. There is also expected to be an effect in 2010 as the provision will influence financial results of firms in 2009 only partially.

Table 1 presents empirical results of the models. The basic model (1) includes the main variables and factor variables only – dummies for the treatment period, treatment industry and treatment country (EU), their two-way interactions and interaction of all three of them (DDD estimator). This model controls for all unobserved effects that are common for all companies within a year and effects that are time invariant for a company (because of the fixed effects). Augmented model (2) includes also control variables in order to reduce bias of the DDD estimator caused by other effects than those accounted for by fixed effects. In this model, the GDP variable is introduced to control for the business cycle and variables of the Solow model (Solow, 1956) – labour and capital – to control for changes in these two basic factors. The next model (3) includes other company-specific variables. These are

liquidity, profitability, leverage and activity – all four of those are representatives of common analytic methods of the financial health of the company.

Models (1), (2) and (3) are estimated using clustered standard errors adjusted for the company. Model (4) and (5) estimate SE clustered by country and industry (2-digit NACE Rev. 2 code) respectively. The reason is that there are country-specific variables and the treatment variable is a combination of an industry-specific and country-specific variable and it is more conservative to clustered standard errors on a higher-level variable (as can be seen from increased standard errors for industry and country). To check the robustness of the results, models (6), (7) and (8) use a different dependant variable. Model (6) uses the same specification as model (5), but turnover is included in the calculation of the dependant variable instead of added value (this also increases the number of observations, but the TFP estimate with turnover is not as straightforward as with added value). Model (7) uses the same specification as model (5), but the dependant variable is profitability of capital (profit before taxes divided by fixed capital) and model (8) uses profitability of labour (profit before taxes divided by the number of employees).

All models also include fixed effects for years and companies and are estimated without outliers of the dependant variable. The model presented below has no problem with heteroscedasticity and serial correlation because clustered standard errors are used. Theoretically, fixed effects should be a proper treatment as an unobserved time-invariant component is not expected to be distributed randomly across units. The Hausman test also confirms the proper use of fixed effects. The correlation of fixed effects and independent variables varies based on the model from 0.02 to 0.25 (in absolute values). According to Torres-Reyna (2007), there should not be a problem with cross-sectional dependence as the panel data have a large number of cross-sectional units and a small number of time units. F-tests show the significance of models (except for model (4) where it cannot be calculated) and correlations of independent variables are insignificant. Incorporation of time fixed effects is convenient as those are significant.

The coefficient of interest, interaction of three terms (time after treatment, treatment industry and the EU) is positive and significant in the first seven models. The impact of the last one is negative but not significant. These results suggest that the impact is significantly positive and robust, though it seems not to have an effect on profitability of labour. The robustness of the results helps with the interpretation, because changing the specification of the model does not change estimation of the treatment variable from the aspect of positive correlation and significance.

Table 1: OLS panel regressions

| VARIABLES         | (1)<br>TFP<br>Added Value | (2)<br>TFP<br>Added Value | (3)<br>TFP<br>Added Value | (4)<br>TFP<br>Added Value | (5)<br>TFP<br>Added Value | (6)<br>TFP<br>Turnover | (7)<br>Profitability<br>Capital | (8)<br>Profitability<br>Labor |
|-------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------------|---------------------------------|-------------------------------|
| Treatment         | 0.214***<br>(0.0126)      | 0.234***<br>(0.0127)      | 0.132***<br>(0.0110)      | 0.132**<br>(0.0522)       | 0.132***<br>(0.0464)      | 0.0861**<br>(0.0354)   | 0.262*<br>(0.152)               | -0.797<br>(0.813)             |
| Labour            |                           | 0.0198***<br>(0.00277)    | -0.129***<br>(0.00245)    | -0.129***<br>(0.0339)     | -0.129***<br>(0.0181)     | -0.316***<br>(0.0161)  | 0.699***<br>(0.148)             | -2.914***<br>(0.513)          |
| Capital           |                           | 0.0128***<br>(0.00117)    | 0.0712***<br>(0.00123)    | 0.0712***<br>(0.0157)     | 0.0712***<br>(0.00961)    | 0.0731***<br>(0.00943) | -2.088***<br>(0.366)            | 0.520***<br>(0.0719)          |
| GDP               |                           | 0.548***<br>(0.00761)     | 0.502***<br>(0.00667)     | 0.502***<br>(0.0987)      | 0.502***<br>(0.0243)      | 0.149***<br>(0.0200)   | 0.259***<br>(0.0492)            | 1.326***<br>(0.193)           |
| Activity          |                           |                           | 0.800***<br>(0.00706)     | 0.800***<br>(0.0866)      | 0.800***<br>(0.0336)      | 1.001***<br>(0.0366)   | -0.640***<br>(0.183)            | 5.030***<br>(0.286)           |
| Liquidity         |                           |                           | 0.0443***<br>(0.00262)    | 0.0443**<br>(0.0172)      | 0.0443***<br>(0.0102)     | -0.000452<br>(0.0129)  | -0.316***<br>(0.0788)           | 0.750***<br>(0.114)           |
| Leverage          |                           |                           | 0.216***<br>(0.0165)      | 0.216*<br>(0.118)         | 0.216***<br>(0.0576)      | 0.221***<br>(0.0262)   | 0.295**<br>(0.118)              | -4.828***<br>(0.548)          |
| Profitability     |                           |                           | 3.346***<br>(0.0243)      | 3.346***<br>(0.175)       | 3.346***<br>(0.236)       | 0.477***<br>(0.0398)   | 17.61***<br>(1.775)             | 31.45***<br>(4.440)           |
| Constant          | -1.220***<br>(0.00446)    | -6.615***<br>(0.0729)     | -7.421***<br>(0.0644)     | -7.421***<br>(0.965)      | -7.421***<br>(0.223)      | -3.248***<br>(0.168)   | 6.085***<br>(1.424)             | -10.24***<br>(1.240)          |
| Observations      | 5,752,342                 | 5,752,344                 | 5,647,955                 | 5,647,955                 | 5,647,955                 | 9,212,646              | 9,207,057                       | 9,218,691                     |
| R-squared         | 0.012                     | 0.015                     | 0.264                     | 0.264                     | 0.264                     | 0.371                  | 0.104                           | 0.185                         |
| Number of company | 1,340,730                 | 1,340,730                 | 1,324,102                 | 1,324,102                 | 1,324,102                 | 1,973,408              | 1,955,335                       | 1,977,744                     |
| Company FE        | YES                       | YES                       | YES                       | YES                       | YES                       | YES                    | YES                             | YES                           |
| Year FE           | YES                       | YES                       | YES                       | YES                       | YES                       | YES                    | YES                             | YES                           |
| Cluster           | Company                   | Company                   | Company                   | Country                   | Industry                  | Industry               | Industry                        | Industry                      |
| Outliers          | NO                        | NO                        | NO                        | NO                        | NO                        | NO                     | NO                              | NO                            |

Cluster standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ , *Treatment* is DDD estimator, *Labour* is the logarithm of number of employees, *Capital* is the logarithm of denominated fixed assets, *GDP* is the logarithm of denominated GDP in Euro, *Activity*, *Liquidity*, *Leverage* and *Profitability* are logarithms of financial ratios explained in Methods, all with use of denominated values. Other interaction terms and dummies for obtaining treatment effect are also included though not listed.

To analyse further, one can include lead and lagged variables of treatment to model (3). The significance of lead variables may suggest that there is a common trend that was present in the data before the treatment occurred and that the results do not need to be causal. Also, insignificance does not necessarily mean that the results are causal, just that it is more plausible (that there was not a common trend before the treatment). On the other hand, a common trend may mean that companies were expecting the treatment and that the impact was visible also in years precluding the treatment, which do not deny causal explanation in total. Significance of lagged variables suggests that the benefits (gains) from the treatment were larger in following years (in this case 2010 and 2011) than the year of treatment itself.

Inclusion of the lead variables of 1 and 2 years reveals significance of the 1-year lead and insignificance of the 2-year lead. From this, it can be said that the results do not need to be causal, because a common trend was present, but it does not exclude the hypothesis that the common trend was caused by expectations of companies. In this case, it can be said that companies were underperforming (e.g. producing less) one year prior to treatment, which might be caused by the expectations that a better legislative framework would be introduced.

Lagged variables are significant and negative (but also controlling for the DDD estimator at the treatment year) and the attitude is on smaller scale than the treatment variable. Therefore, the effect in following years was weaker than in the year of treatment, but according to the attitudes of the coefficients, it was still positive overall.

Table 2: Lags and leads

| VARIABLES         | (1)                      | (2)                     |
|-------------------|--------------------------|-------------------------|
|                   | TFP<br>Added Value       | TFP<br>Added Value      |
| Treatment         | 0.00815<br>(0.0134)      | 0.127***<br>(0.0137)    |
| Treatment_lead1   | -0.00810***<br>(0.00243) |                         |
| Treatment_lead2   | 0.000939<br>(0.00218)    |                         |
| Treatment_lag1    |                          | -0.0122***<br>(0.00304) |
| Treatment_lag2    |                          | -0.0144***<br>(0.00285) |
| Labour            | -0.207***<br>(0.00299)   | -0.145***<br>(0.00377)  |
| Capital           | 0.0493***<br>(0.00132)   | 0.0419***<br>(0.00188)  |
| GDP               | 0.576***<br>(0.00716)    | 0.493***<br>(0.00935)   |
| Activity          | 0.566***<br>(0.00631)    | 0.735***<br>(0.0110)    |
| Liquidity         | 0.0238***<br>(0.00264)   | 0.0370***<br>(0.00388)  |
| Leverage          | 0.108***<br>(0.0143)     | 0.212***<br>(0.0264)    |
| Profitability     | 3.503***<br>(0.0246)     | 3.361***<br>(0.0344)    |
| Constant          | -7.559***<br>(0.0690)    | -6.863***<br>(0.0909)   |
| Observations      | 3,182,197                | 3,111,009               |
| R-squared         | 0.272                    | 0.269                   |
| Number of company | 906,623                  | 897,707                 |
| Company FE        | YES                      | YES                     |
| Year FE           | YES                      | YES                     |
| Cluster           | Company                  | Company                 |
| Outliers          | NO                       | NO                      |
| Lags              | NO                       | YES                     |
| Leads             | YES                      | NO                      |

Cluster standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ , *Treatment* is DDD estimator, *Labour* is the logarithm of the number of employees, *Capital* is the logarithm of denominated fixed assets, *GDP* is the logarithm of denominated GDP in Euro, *Activity*, *Liquidity*, *Leverage* and *Profitability* are logarithms of financial ratios explained in Methods, all with use of denominated values. Other interaction terms and dummies for obtaining the treatment effect are also included though not listed.

## 7 Conclusion

The Service Directive puts into motion the topic drafted in Treaty of Rome in 1957 – free movement of services. Debate following its introduction opened space for arguments both in favour and opposed to the Directive’s impact on companies.

This article tries to complement current – theoretical legal and empirical economic – research of the topic by discovering the impact of the Directive on affected companies and their productivity. Apart of



the previous articles, this one uses microeconomic data and specialised on productivity, not trade, as is understood that productivity is a superior goal to trade when considering the legal point of view.

The results suggest that despite the extensive literature on the weakness of the Directive, there is a positive and significant correlation with performance of companies.

On the other hand, it is important to stress that causal implications derived from this article need to be taken with care. With a very careful approach, all interactions in this article should be considered only as correlations. This article aims to exclude effects that might bias the results by measures that allow one to approach the causal implications. These include e.g. panel data structure (compared to cross-section), microeconomic data (compared to macroeconomic), fixed effects, triple differences research design (compared to DD or D research design), control variables and robustness tests. The article aims to approach the causal implications as much as possible, though it is known that the causal implication cannot be carried out yet.

In the coming years, it will be possible to carry out another research with more data points (both time and cross-section as well), which would be very useful for dealing with missing data. Another way of the future research might be use of qualitative data altogether with quantitative data, but the most promising seems to be further considerations of the results with respect to causality, so that the results might be hopefully announced as causal. Future analysis can also focus on long-term benefits, as this one focuses only on a short time period.

## References

- BADINGER, H., MAYDELL, N (2009). Legal and Economic Issues in Completing the EU Internal Market for Services: An Interdisciplinary Perspective. *Journal of Common Market Studies*, 47 (4), 693-717. DOI: 10.1111/j.1468-5965.2009.02001.x.
- BUREAU VAN DIJK (2015). *Amadeus Database*. Available at: <https://amadeus.bvdinfo.com/version-2015423/home.serv?product=amadeusneo>.
- CORUGEDO, E. F., RUIZ, E. P (2014). The EU Services Directive: Gains from Further Liberalization. *IMF Working Paper WP/14/113*.
- DE BRUIJN, R., KOX, H., LEJOUR, A. (2006). The Trade-Induced Effects of the Service Directive and the Contry-of-Origin Principle. *Working paper no. 44*. April 2006. EUROPEAN NETWORK OF ECONOMIC POLICY RESEARCH INSTITUTES. ISBN 92-9079-619-7.
- DELGADO, J. (2006). The European Service Directive. *U.S.-Europe Analysis Series*. The Brookings Institution. Available at: [http://aei.pitt.edu/8398/1/EN\\_JD\\_Brookings\\_Paper\\_April06.pdf](http://aei.pitt.edu/8398/1/EN_JD_Brookings_Paper_April06.pdf).
- DETTMER, B. (2015). Trade Effects of the European Union's Service Directive: Contrasting ex ante Estimates with Empirical Evidence. *World Economy*, 38 (3), 445-478. ISSN: 03785920. DOI: 10.1111/twec.12149.
- EUROPEAN COMMISSION. (2002). *REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT ON THE STATE OF THE INTERNAL MARKET FOR SERVICES presented under the first stage of the Internal Market Strategy for Services*. COM(2002)441.
- EUROPEAN COMMISSION. (2004). *Proposal for a Directive of the European Parliament and of the Council on services in the internal market*, SEC(2004). 21 COM/2004/0002 final.
- EUROPEAN COMMISSION (2012). *REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN CENTRAL BANK, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE, THE COMMITTEE OF REGIONS AND THE EUROPEAN INVESTMENT BANK STATE OF THE SINGLE MARKET INTEGRATION 2013 - Contribution to the Annual Growth Survey 2013*. COM/2012/0752 final.
- EUROPEAN COMMISSION (2013). *REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN CENTRAL BANK, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE, THE COMMITTEE OF REGIONS AND THE EUROPEAN INVESTMENT BANK A SINGLE MARKET FOR GROWTH AND JOBS: AN ANALYSIS OF PROGRESS MADE AND REMAINING OBSTACLES IN THE MEMBER STATES - Contribution to the Annual Growth Survey 2014*. COM/2013/0785 final.
- EUROPEAN PARLIAMENT. (2006). *Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market*, O.J. L 376, p. 36-68.
- EUROPEAN UNION. (1957). *Treaty Establishing the European Community (Consolidated Version)*, Rome Treaty, 25 March 1957, available at: <http://www.refworld.org/docid/3ae6b39c0.html> [Retrieved at: 2016-09-15].
- EUROSTAT (2016). *Eurostat database* [online]. [Retrieved at: 2016-03-27]. Available at: <http://ec.europa.eu/eurostat/data/database>.
- FRANKEL, J.A., ROMER, D. (1999). Does Trade Cause Growth? *American Economic Review*, 89 (3), 279-399. DOI: 10.1257/aer.89.3.379.
- GOEDHUYS, M., SRHOLEC, M. (2015). Technological Capabilities, Institutions and Firm Productivity: A Multilevel Study. *European Journal of Development Research*, 27 (1), 122-139. ISSN: 0957-8811. DOI: 10.1057/ejdr.2014.32.

MONTEAGUDO, J., RUTKOWSKI, A., LORENZANI, D (2012). The economic impact of the Service Directive: A first assessment following implementation. *Economic Papers* 456. European Commission. ISBN 978-92-79-22977-0. DOI: 10.2765/26370.

RENTROP, T (2007). The Services Directive: What is Actually New? *EIPASCOPE*, no. 2, pp. 1-6. Available at: [http://aei.pitt.edu/11069/1/20071106123232\\_treSCOPE2007%2D2\\_internet%2D4.pdf](http://aei.pitt.edu/11069/1/20071106123232_treSCOPE2007%2D2_internet%2D4.pdf).

SOLOW, R. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, 70 (1), 65-94. ISSN: 0033-5533.

TIMMERMAN, P (2009). Legislating amidst Public Controversy: The Services Directive. *Egmont Paper* 32. ISBN 978 90 382 1506.

TORRES-REYNA, O (2007). *Panel Data Analysis: Fixed and Random Effects Using Stata*. In: Princeton [online]. [Retreived at: 2015-03-16]. Available at: <http://www.princeton.edu/~otorres/Panel101.pdf>.

WHITTAKER, J., WHITEHEAD, C., SOMERS, M. (2005). The neglog transformation and quantile regression for the analysis of a large credit scoring database. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, 54 (5), 863-878. DOI: 10.1111/j.1467-9876.2005.00520.x.