The Effect of Joining the EU on Firms' Export: Evidence from Micro Level Data

by

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Abstract

In my thesis I investigate the effect of joining the European Union on firms' export performance. Using the micro-level data from 2001, 2004 and 2008 I estimate the difference in percentage of exports for firms operating in Central and Eastern European (CEE) countries that joined the EU on 1 May 2004 compared to firms operating in the non-EU CEE countries. The empirical findings confirm the hypothesis that joining the EU increases firm-level exports. The decomposition of this effect into extensive and intensive margins shows that the growth of foreign trade is mainly due to an increase in percentage of exporting firms, while there is no significant change in average fraction of sales abroad for firms-exporters. Such results may be considered as evidence that the EU accession reduces fixed cost of export.

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Introduction

The joining to the European Union is an extremely important event for people living in the accession countries. The previous and current European experience shows that the uniting of the continent into one huge power, started in the year 1952, is an inevitable and unstoppable process. Obviously, such a process has a great effect on the current and new member states. It is not surprising that the most direct effect of the joining to the EU consists in trade liberalization. Actually, according to the European Commission, creating of the single market with free flows of goods, services, people and capital is one of the main goals of the EU.

1 May 2004, when 10 new countries joined the EU, is the day of the biggest enlargement of the EU. However, for the new members the process of European integration, including trade liberalization, began earlier. Since abolishing of trade barriers requires both efforts and time, future EU members started the process of trade liberalization long before they joined the EU. Still, the accession itself was very crucial event that does have an effect on the behavior of all economic entities.

The effect of the EU accession and related trade liberalization on countries' exports, as the most natural consequence of it, is much investigated in the economic literature. Most of works, however, concentrate on the macro patterns of trade. For instance, Cecília Hornok (2008) found that bilateral trade growth between Central and Eastern European countries during the period after they joined the EU in 2004 is much higher than trade growth within the other EU countries during the same period. Definitely the change in export tendencies on the country or industry level is rather important for conducting successful economic policy. Nonetheless, in my opinion, for better understanding of the underlying mechanisms of trade liberalization process connected to the EU enlargement it is crucial to investigate this issue on

the micro level. Firms, as the main market entities, should react quickly to the new circumstances and change their behavior in accordance to them. Unquestionably, the patterns of trade do not exist without firms. Though it is possible to deduce some general tendencies observing macro data, deeper investigation requires analyzing the issue on the firm level.

To the best of my knowledge, my work is the first one that investigates the direct effect of the 1 May 2004 EU enlargement on new members' firms' export-orientedness. Particularly, I test the hypothesis whether the percentage of the sales the firms export has significantly increased in the countries that joined the EU. For this I use a pooled cross-section model with controlling for different firm characteristics and estimate the difference between the EU from 2004 and non-EU CEE countries in the years 2001, 2004 and 2008. As expected, empirical results provide evidence in favor of this hypothesis. However, this effect can be divided in two parts. On the one hand, the increase of the export-orientedness in the countries that joined the EU in 2004 may be caused by the increase in the fraction of firms that export. On the other hand, this result may be due to the fact that an average firm-exporter in those countries started to export higher percentage of its sales. In order to investigate this question, I decompose the percentage of sales into extensive (the fraction of firms that export) and intensive (the average percentage of export among exporters) margins. The results of this decomposition suggest that the increase of export comes mostly from the increase in the number of firms that export their production. Still, due to the limitation of my data, I cannot make a strict conclusion about the impact of the intensive margin, even though there is evidence against it.

The rest of my thesis is structured as follows. In the first Chapter I present the theoretical background and review the related literature. In the next chapter the data I used in my work is described. The third Chapter shows descriptive statistics of the variables that I use in my model. In the fourth chapter I describe my methodology and provide the estimation

equations, in the fifth I display empirical results of my estimation and analyze the findings. In the last section of my paper I summarize the results and provide recommendations for future researches.

Chapter 1: Stylized Facts about the Effect of Trade Liberalization on Export

The trade liberalization, as one of the main result of countries' accession to the EU, may have an effect on the domestic enterprises' performance in the countries in many dimensions. Obviously, its impact on the firms' export is the most natural one and hence it was highly discussed and investigated in related literature. Still, the classical trade models, including comparative advantage and factor proportions theories, are more concentrated on the industry patterns of trade. Although these factors are very important, new evidence shows that allowing for firms to be different within the same industry is important for explaining micro-level patterns of trade.

Bernard, Jensen, Redding and Schott (2007) collected some empirical evidence about exporters in the case of the United States. In fact, quite a small amount of firms export their production (18% of all manufacturing firms in the year 2002). At the same time, exporters in the US tend to have higher employment, wages and productivity, even accounting for the industry fixed effect. Though these indicators are calculated on the US sample, there is no evidence that the situation in Europe is much different. Moreover, Mayer and Ottaviano (2008) observed similar statistics for European firms.

The first theoretical model of international trade that allows for firms to be different within the same industry is the Melitz (2003) model. In his work the author incorporated firms' productivity heterogeneity into Krugman's (1979) model of international trade with monopolistic competition. Using this framework, Melitz showed that trade liberalization and subsequent lowering of trade costs causes more firms to export and since these exporters have higher productivity than non-exporters, the labor force is reallocated to them and the least-

productive firms exit the market. Thus, not only inter-industry reallocation, as the result of trade liberalization, but also intra-industry firms' productivity has an effect on firms' export-orientedness.

Heterogeneity of enterprises is not limited by their productivity. Another important characteristic that may have an effect on a firm's export is its ownership structure. Although not highly investigated in international trade literature, the positive impact of foreign ownership on firms' export-orientedness is observed in some empirical studies. For instance, Zsuzsa Munkácsi (2009) found that in the case of Hungarian industrial enterprises the positive relation between foreign ownership and firm's export relations holds even after controlling for other firm's characteristics.

Obviously, the EU enlargement is a very important political and economical event; hence, its consequences, including the effect on export relations, are often investigated in empirical papers. However, most of the researches consider the effect of the joining the EU on a country or an industry level. At the same time, the effect of joining the EU on firm performance is not highly investigated. Still, there are some empirical studies that can be considered as related to my work.

Minoas Koukouritakis (2005), analyzing effect of the EU accession on Greek trade flows, found a negative effect of trade liberalization on the country's net export. The author explains such unexpected outcome by the complexity of trade liberalization connected to joining the EU: it results not only in tariff reduction, but also in subsidy elimination. Abolishing of large financial support that existed before the joining to the EU resulted in decreasing of foreign compatibility for Greek economy.

Cecília Hornok (2008) using macro data analyzed the effect of the EU accession on the export in Central and Eastern European countries that joined the EU in 2004. Using panel data, the author found that countries that joined the EU had an increase of bilateral export by

15%. The result is general across industries, but it differs significantly between countries. The decomposition of the effect showed that this result occurred mostly on the intensive margin, which means that the countries that joined the EU started to export more of the product they were specialized in exporting before the entry, while there was no significant increase in the number of products exported.

Similar results can be observed in some other papers, like C. Papazoglou, E.J. Pentecost and H. Marques (2006) that analyze the EU enlargement that occurred in 2004. However, its effect on the change of firms' performance in terms of export is still not investigated. Thus, the contribution of this paper is to fill a gap in analysis of the export effects of the EU enlargement for the new members on the micro-level.

Chapter 2: Data Description and Variable Specification

For my work I use the data from *Business Environment and Enterprise Performance Survey* (BEEPS) provided by European Bank for Reconstruction and Development (EBRD). These datasets contain a lot of micro-level information for the firms operating in 28 countries of Central and Eastern Europe (CEE), including Turkey, and the Commonwealth of Independent Sates (CIS). I use the data for CEE countries only. There are four rounds of the Survey available (for 1999, 2002, 2005 and 2009) out of which I use the latter 3 since the first round does not cover some countries of concern. Furthermore, the data of 2002 and 2005 rounds were collected for previous years (2001 and 2004 respectively), while the data in the last round were collected for years 2007 (relatively few observation and only for some countries) and 2008-2009 (most observations for 2008 though).

The distribution criteria of the survey samples are taken in accordance to the sector's contribution to GDP of the country, the size of the firm, its ownership structure, export relation, and location. At the same time there are some minimum restriction for some parameters: at least 15% of firms in the country should operate in manufacturing or services; at least 10% of enterprises should be in each small (2-49 employees), medium (50-249) and big (250-10000) category; at least 10% should be owned by a foreigner, and the same minimum quota is for state-owned firms; at least 10% of enterprises should be exporters (export 20% and more of their total sales) and at least 10% of firms should have location regarded as "small city of countryside" (has population of 50000 or less). The enterprises that operate in sectors regulated by government, have only 1 or more than 10000 workers, or were established just before the Survey took place (depending on the round of the BEEPS) are excluded from the sample.

For my sample (CEE countries and Turkey) there are 3900 observations in the year 2002, 5597 observations for 2005 and 6261 completed observation for 2009. Altogether I have 15758 observations in pooled cross-section data sample. The country quotas are approximately in line with their size. Overall, the sample can be considered as representative enough; restriction issues are not very crucial and should be eliminated by the size of the sample.

There are two variables connected with firms' export relation in the data: the percentage of sales exported directly and indirectly through a distributor. For the main dependent variable, *total export*, I take the sum of these 2 variables. I also use the dummy variable *exporter* that is 1 for the firms with *total export* greater than 0. The datasets for years 2002 and 2005 include no information about exact amount of employees on the firm; there is only a variable indicating whether the enterprise belongs to small, medium and big category available. The dataset for the year 2009 provides precise information about firms' employment, but for comparison I divided them into the same categories. Hence, in my work I use 2 dummy variables for controlling of the size of firms: *medium employment* (dummy variable that is 1 if there are 50-249 workers employed on the enterprise) and *high employment* (dummy that is 1 if there are 250-10000 employees on the firm).

The data from 2002 and 2005 also do not provide exact information about firms' sales. However, all the enterprises are divided in quite detailed categories: under $10,000; $10,000-$19,000; $20,000-$49,000; $50,000-$99,000; $100,000-$249,000; $250,000-$499,000; $500,000-999,000; $1-1.99 million; $2-4.99 million; $5-9.99 million; $10-19.99 million; $20-49.99 million; $50 million or more. I consider such a classification as too detailed since, for instance, there may be not very much difference in terms of export relation between $20-49 thousand and $50-99 thousand. This is the reason why I control in this paper for more general categories: under $10,000; $10,000-$99,000; $100,000-$999,000; $1-9.99 million; $10

million or more. For the year 2009 there is again precise information about firms' sales instead of categorized one, but measured in units of the particular country currency. Thus, at first I convert the values for sales into US dollars using annualized exchange rates provided by *CIA World Fact Book*, and then divide them into the categories described earlier.

In terms of ownership structure the Survey for each period provides the information about percentage of the enterprise owned by foreign private company or organization, domestic private company or organization and government or state. Using this information I constructed two dummy variables: *foreign ownership*, which indicates whether foreigner owns the largest part of the firm and *private ownership*, which indicates whether the sum of the parts of foreign and domestic private owners is greater than the part under state control.

In years 2002 and 2005 industry relation of the firms is described by the percentage of sales that come from operating in following sectors: mining and quarrying; construction; manufacturing; transport, storage and communication; wholesale, retail, repairs; real estate, renting and business services; hotels and restaurants and other. The 2009 Survey gives more precise information about industry sector a firm operates in. All enterprises are divided by the main product into such categories: other manufacturing, food, textiles, garments, chemicals, plastics & rubber, non-metallic mineral products, basic metals, fabricate metal products, machinery and equipment, electronics, construction, other services, wholesale, retail, hotel and restaurants, transport, and IT. For the purpose of my study I divided all the firms into 7 categories using the same sectors as in 2002 and 2005 but uniting categories "other" and "real estate, renting and business services" into the single one due to the fact that in the year 2009 there are no enterprises which can be included into "real estate" sector. Thus, the firms in 2002 and 2005 were included into particular category if the biggest part of theirs sales came from that sector, while for 2009 period I used the following classification. Non metallic mineral products and basic metals were included into "mining and quarrying" category;

construction – into "construction" category; other manufacturing, food, textiles, garments, chemicals, plastics & rubber, fabricate metal products, machinery and equipment, and electronics – into "manufacturing" category; transport – into "transport, storage and communication" category; wholesale and retail – into "wholesale, retail, repairs" category; hotel and restaurants – into "hotels and restaurants" category; IT and other services were included into "real estate and other services".

Finally, I constructed for each period a dummy variable that indicated whether the country in which the firm operates joined the European Union on 1 May 2004. In the data provided by BEEPS there are 8 such countries: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia. Only two of the smallest countries that took part in the year 2004 Enlargement of the EU were not included in this sample – Cyprus and Malta. As a control group firms from other countries with similar geographic, political and economical circumstances were chosen – Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Turkey, Yugoslavia (in 2002 and 2005), Serbia, Montenegro and Kosovo (in 2009). The countries from the control group either joined the EU later (Bulgaria and Romania on January 1st, 2007) or are (potential) candidates to the European Union. Thus, I consider that comparison of these country groups in terms of firms' export relation is reliable enough for my study.

Chapter 3: Descriptive Statistics

The average values of the *total export*, *exporter* and *total export* for exporters only for both groups and all 3 periods are shown in Table 1. We can see that there is no clear evidence that the firms operating in countries that joined the EU in 2004 (the EU countries) export more than firms from the other countries. The differences between average values of total export, percentage of exporting firms and average export among firms that export is rather small, which confirms my assumption that firms from treatment and control group are approximately the same in export relations.

Table 1: Average Values of Dependent Variables

	EU from 2004				**Non-EU**			
Variable\Period	2001	2004	2008[1]	All periods	2001	2004	2008	All periods
Total export (% of sales)	13.32	12.19	15.99	13.83	12.19	12.39	15.94	13.79
Exporter	0.328	0.286	0.384	0.331	0.327	0.321	0.357	0.341
Total export (exporters only) (% of sales)	40.61	42.69	41.67	41.79	37.29	38.66	44.60	40.47

The statistics of ownership and employment structure is shown in Table 2. The values shown verify the previous finding: enterprises in both groups of countries have similar dynamics of change in private/state ownership structure. In both groups the process of privatization can be noticed; the only significant difference is that in non-EU sample the percentage of foreign firms decreased for all the periods while in the EU sample this fraction quite expectedly increased in the last period.

[1] Here and after observations for years 2007 and 2009 are included in 2008 period.

Table 2: Ownership and Employment Structure Statistics (average values for the variable for particular period are displayed)

	EU form 2004				Non-EU			
Variable\Period	2001	2004	2008	All periods	2001	2004	2008	All periods
Private ownership	0.801	0.932	0.964	0.904	0.798	0.911	0.974	0.899
Foreign ownership	0.127	0.087	0.111	0.106	0.142	0.093	0.067	0.099
Medium employment	0.189	0.233	0.303	0.239	0.189	0.201	0.282	0.222
High employment	0.130	0.083	0.098	0.104	0.143	0.090	0.091	0.105

The statistics of sales for different period is shown in Table 3. The overall tendency is such that the total sales of the firms increased during the observation periods. It is also worth noting that the percentage of the firms with sales of $10 million or more in the EU countries increased mostly from 2001 to 2004, while in the non-EU countries the great increase of this fraction was during 2004-2008 period. Thus, the overall tendency is such that firms in the EU countries have higher total sales compared with the non-EU countries, but the most significant difference between them was in the year 2004.

Table 3: Sales Distribution (the percentage of firms of each sales category for particular period are displayed)

	EU form 2004				Non-EU			
Sales\Period	2001	2004	2008	All periods	2001	2004	2008	All periods
under $10,000	1.50	0.18	0.08	0.49	1.60	0.18	0.37	0.60
$10-$99,000	18.49	10.83	3.52	10.41	20.85	15.78	5.87	13.47
$100-$999,000	43.86	33.84	24.25	33.50	44.16	45.75	26.23	37.79
$1-9.99 million	28.04	26.78	34.23	29.96	25.43	28.66	31.92	29.58
$10 million or more	8.12	28.27	37.87	25.59	7.96	9.63	35.56	18.56

In Table 4 the distribution of enterprises between industry sectors is shown. Most firms in both groups of countries operate in manufacturing and wholesales, retail, repair industries. The fraction of firms from these sectors was more than 50% in 2001 and went up to more than 65% till 2008. However, in the EU countries most firms operated in wholesale, retail, repair sector, while in the non-EU countries manufacturing was the leading industry. Consequently, the fractions of firms operating in the other industries either decreased or stayed stable during the 2001-2008 periods. Some trends in other industry are also observed that is quite natural due to overall economic dynamics as well as due to the changes connected with the EU accession for control group.

Table 4: Industry Statistics (the percentage of firms operating in each industry during the particular period are displayed)

	EU from 2004				**Non-EU**			
Sector \ Period	2001	2004	2008	All periods	2001	2004	2008	All periods
Manufacturing	25.60	33.83	33.29	31.50	26.03	41.06	42.74	38.11
Construction	11.34	9.03	11.33	10.27	10.22	8.85	7.31	8.57
Mining and quarrying	0.88	2.50	2.29	2.00	1.39	0.72	5.08	2.21
Hotels and restaurants	5.98	5.90	4.17	5.32	9.31	5.85	3.43	6.00
Transport and communication	9.37	6.73	5.64	7.17	7.77	6.50	4.35	6.03
Wholesale, retail, repair	30.96	32.97	39.06	33.98	29.68	23.97	33.18	28.16
Real estate and other	15.87	9.03	4.21	9.77	15.61	13.06	3.90	10.93

In order to provide better vision for the difference of exporting within each of groups, I calculate the distributions displayed in Tables 5-8. In Table 5 the overall tendency of export within employment categories is displayed. These results confirm the previous finding about changes in export-orientedness of firms for different periods. They also confirm theoretical prediction that bigger firms tend to be more export-oriented. Interestingly, in the year 2008,

after EU accession occurred, the firms of each size category in non-EU sample export more than in the EU sample, which is rather counterintuitive.

Table 5: Fraction of Sales Exported Within Employments Categories.

	EU from 2004				Non-EU			
Employment\Period	2001	2004	2008	All periods	2001	2004	2008	All periods
Low employment	0.23	0.20	0.27	0.23	0.23	0.24	0.27	0.25
Medium employment	0.51	0.44	0.54	0.50	0.48	0.47	0.57	0.51
High employment	0.60	0.56	0.58	0.59	0.57	0.58	0.64	0.59

In Table 6 the export distribution within sales categories is shown. Although this statistics is similar to previous results, it provides some interesting findings. While for the period 2004-2001 the percentage of sales exported within each sales category fell in both treatment and control groups; in the year 2008 these indicators increased for the EU sample with no change or even decline for the other group.

Table 6: Fractions of Export Within Sales Categories.

	EU from 2004				**Non-EU**			
Sales\Period	2001	2004	2008	All periods	2001	2004	2008	Total
under $10,000	0.00	0.00	0.50	0.04	0.14	0.50	0.15	0.20
$10-$99,000	0.10	0.08	0.09	0.09	0.13	0.08	0.08	0.10
$100-$999,000	0.27	0.21	0.23	0.23	0.30	0.26	0.26	0.28
$1-9.99 million	0.53	0.39	0.45	0.45	0.54	0.47	0.42	0.47
$10 million or more	0.69	0.37	0.45	0.45	0.64	0.62	0.43	0.50

The statistics of the fraction of sales exported for firms with different ownership structure, displayed in Table 7, shows that the same tendencies as for the sales and employment structures can be observed. There is not much difference between the two samples, but rather unexpected finding is the fact that state owned firms and privately owned

firms do not differ significantly in the amount of sales exported. However, this phenomenon may be explained by differences in size of firms if it is true that state owned firms are usually larger than private ones.

Table 7: Export Distribution within Ownership Structure

	EU from 2004				Non-EU			
Ownership\Period	2001	2004	2008	All periods	2001	2004	2008	All periods
Private ownership	0.33	0.29	0.39	0.33	0.33	0.31	0.39	0.34
State ownership	0.33	0.28	0.34	0.31	0.33	0.32	0.47	0.34
Domestic ownership	0.29	0.26	0.36	0.30	0.29	0.29	0.38	0.32
Foreign ownership	0.60	0.56	0.61	0.59	0.55	0.60	0.57	0.57

Table 8: Average Fractions of Sales Exported for Different Industries.

	EU from 2004				Non-EU			
	2001	2004	2008	All periods	2001	2004	2008	All periods
Manufacturing	0.61	0.47	0.62	0.55	0.54	0.44	0.58	0.51
Construction	0.13	0.12	0.13	0.13	0.22	0.12	0.20	0.17
Mining and quarrying	0.06	0.47	0.61	0.47	0.49	0.60	0.46	0.48
Hotels and restaurants	0.31	0.14	0.19	0.20	0.12	0.18	0.18	0.15
Transport and communication	0.51	0.42	0.51	0.48	0.44	0.39	0.57	0.45
Wholesale, retail, repair	0.19	0.15	0.26	0.21	0.25	0.22	0.18	0.22
Real estate and other	0.21	0.18	0.27	0.21	0.24	0.20	0.27	0.22

The industry characteristics, shown in Table 8 confirm that the firm's sector is important in explaining its export-orientedness. In this case the EU and non-EU samples are rather different: although the fraction of sales exported within each industry are quite similar for treatment and control group, the overall dynamics of export during observation periods differs in lots of sectors. This situation may be evidence in favor of the hypothesis that

integration into the EU has a significant effect on the industry structure in the countries that joined the EU.

Chapter 4: The Estimation Methodology

First I want to test my main hypothesis that firms in countries that joined the EU on 1 May 2004 tend to export more in 2009. This actually means not only that the enterprises from 8 countries that joined the EU should have higher average export that year than enterprises from other countries, but also that this difference is bigger than for periods before joining the EU. In such a case I need to take into account the difference between treatment (EU from 2004) and control (the non-EU) groups in the periods before the effect from joining the EU arose. For this reason I analyze 3 periods and control for difference between the EU and non-EU countries for each period.

The theory and empirical studies of international trade on the micro level show that exported firms are not randomly chosen, but self-select themselves into trade according to some characteristics. In particular, exporters are significantly more productive, larger in terms of sales and employment. Since these characteristics may differ for the treatment and control groups, I need to take them into account in my estimation. Due to the data available I cannot control for the firm's productivity, but since this variable is highly correlated with the firm's size and employment, I assume that it is enough to control for these variables in order to take into account firms' heterogeneity.

Furthermore, I assume that firm ownership structure may have an effect on firms export relation. In particular, since state-owned firms usually are less dynamic and are in worse state, I expect them to be less export-oriented than private firms. At the same time, there is possibility that firms owned by foreigner are more export-oriented than domestic firms because foreign owner may have an advantage in acquiring an access to external markets. Since ownership structure may differ for the EU and the non-EU countries for different periods, I control for these factors in my model.

Obviously, firms from different sectors have different chance to become exporters. Particularly, the firms that produce manufacturing goods have higher likelihood to be export-oriented. As sector structure may be different within the treatment and control group and it also could change in the result of the EU accession, it is necessary to control for it in my estimation.

Finally, due to the fact that export-orientedness is highly affected by overall economic tendency, I need to take into account different periods. In such case dummies for the firms operating in the countries that joined the EU on 1 May 2004 show exact difference between treatment and control group for particular periods.

Thus, my main estimation equation can be constructed as follows:

$$total\_export_i = \alpha \cdot \beta \; eujoined2001_i + \beta \cdot eujoined2004_i + \beta \cdot eujoined2008_i + \gamma \cdot \bar{E}_i + \gamma \cdot \bar{S}_i + \gamma \cdot private_i + \gamma \cdot foreigner_i + \gamma \cdot \bar{I}_i + \gamma \cdot \bar{Y}_i + \varepsilon_i, \quad (1)$$

where

$total\_export_i$ is the percent of sales exported by firm i;

$eujoined2001_i$ – the dummy variable which is 1 if the firm i in the year 2001 operated in the country that joined the EU on 1 May 2004;

$eujoined2004_i$ – the dummy variable which is 1 if the firm i in the year 2004 operated in the country that joined the EU on 1 May 2004;

$eujoined2008_i$ – the dummy variable which is 1 if the firm i in the year 2008 (2007, 2009) operated in the country that joined the EU on 1 May 2004;

$\bar{E}_i$ is a vector of employment dummies (see Data description and variable specification for more details);

$\bar{S}_i$ is a vector of Sales dummies (see Data description and variable specification for more details);

$private_i$ is the dummy indicating whether firm i has private owner;

$foreigner_i$ – the dummy indicating whether firm *i* is owned by foreigner;

$\bar{I}_i$ is a vector of industry sector (see Data description and variable specification for more details);

$\bar{Y}_i$ is a vector of year in which the observation of firm *i* took place;

u_i is idiosyncratic error term.

Due to such model specification and under assumptions all the effect of trade liberalization is taken by *eujoined*2008 dummy, and there are no omitting variables, the coefficient β shows whether the firms in the countries that joined the EU tend to export more, while the difference between β and β demonstrates whether there was an increase in firms' export-orientedness following their countries joined the EU.

The effect observed in the first equation can be decomposed in 2 dimensions. At first, the overall change in total export may be caused by the change in number of export-oriented firms. In other words, the difference in export-orientedness among firms in treatment and control group (if such exists) may be due to the fact that in the EU countries on average more firms export. In order to test this hypothesis, I regress the exporter dummy on the same set of independent variables as in the first equation:

$$exporter_i = \alpha \cdot \beta \cdot eujoined2001_i + \beta \cdot eujoined2004_i + \beta \cdot eujoined2008_i + \gamma \cdot \bar{E}_i + \gamma \cdot \bar{S}_i + \gamma \cdot private_i + \gamma \cdot foreigner_i + \gamma \cdot \bar{I}_i + \gamma \cdot \bar{Y}_i + \iota_i, \quad (2)$$

where $exporter_i$ is the dummy variable indicating whether firm *i* exports at least some amount of its production. In this model the coefficient β shows whether in the EU countries there are more exporting firms compared to the non-EU countries, while the difference between β and β demonstrates whether there was an increase in firms' export-orientedness connected to the fact of their countries' accession to the EU.

Finally, the overall change in total export may be also caused by intensive margin, or, in other words, by the amount of goods the typical firm-exporter sells abroad. To investigate

the effect of intensive margin I estimate the equation 1 but restrict the sample in such a way that only export-oriented firms are taken into account. In such a case coefficient β shows whether typical export-oriented firm in the treatment group exports greater percentage of its sales and β - β shows if there is a change in this indicator caused by the fact that countries in the treatment group joined the EU.

Chapter 5: Empirical Results

The estimation results of equation 1 are shown in Table 9. Due to the fact that the dependent variable in my regression is a percentage of sales that cannot be smaller than 0 and greater than 100, I use censored regression model (Tobit). Out of the total sample of 15758 observations 2564 (16.3%) are excluded from the estimation sample because of missing observations. However, under assumption that true values of missing variables do not correlate with the probability of them to be omitted, the regression provides consistent estimators for the independent variables.

Since Tobit coefficients cannot be interpreted in the same way as OLS estimators, their sign and significance are the indicators that I analyze in this model. The coefficient near the *eujoined*2008 dummy is positive and significant (p-value < 0.01), as expected. It means that in fact in the last period enterprises situated in countries that joined the EU on the 1 May 2004 tend to be more export-oriented comparing to the enterprises situated in the non-EU countries. The coefficient near the *eujoined*2001 dummy is positive but insignificant (p-value ≈ 0.5), which is also rather predictable and confirms the hypothesis that before joining the EU the countries in the treatment group did not have any advantage in terms of possibility of exporting. The coefficient near the *eujoined*2004 (p-value < 0.0001), however, is negative and significant, which is quite unexpected. The difference between $\beta_{\_}$ and β is positive and significant (Wald test gives p-value for $\beta_{\_} = \beta$ null-hypothesis smaller than 0.0001), which is the evidence in favor of main hypothesis that joining the EU had positive effect on firms' export-orientedness. However, the difference between $\beta_{\_}$ and $\beta_{\_}$ is insignificant (Wald test p-value = 0.27), which means that I cannot argue that the difference in firms' export-orientedness between the treatment and control groups in year 2001 and 2008 is significant. However, since in 2004 firms in the non-EU countries tend to export more, I can suggest the

Table 9: Estimation Results of the First Equation (calculated using Censored Normal (TOBIT) (Quadratic hill climbing) method)

Dependent Variable: EXPORT_TOTAL	
Variable	Coefficient (Standard error)
EUJOINED2001	1.553218 (2.257864)
EUJOINED2004	-7.827313*** (1.641973)
EUJOINED2008	4.707768*** (1.764159)
EMPLOYMENT_MEDIUM	20.58176*** (1.669665)
EMPLOYMENT_HIGH	27.38878*** (2.289513)
SALES_100K	-8.600214 (10.16196)
SALES_1000K	26.78114*** (9.914230)
SALES_10000K	41.80678*** (9.964092)
SALES_10000K_MORE	36.26524*** (10.03163)
OWNERSHIP_PRIVATE	10.39572*** (2.352126)
OWNERSHIP_FOREIGN	30.94961*** (1.947278)
CONSTRUCTION	-66.70617*** (2.6053570
HOTELS_AND_RESTAURANTS	-42.82926*** (3.552507)
REAL_ESTATE_AND_OTHER	-43.67275*** (2.375280)
TRANSPORT_AND_COMMUNICATION	-6.024840** (2.689829)
WHOLESALE_RETAIL_REPAIR	-49.78465*** (1.578265)
MINING	-11.47968*** (3.854227)
YEAR2001	7.090349*** (2.237455)
YEAR2004	-1.031828 (1.749713)
C	-48.78160*** (10.31079)
Sigma	55.79688*** (0.703856)
Adjusted R-squared	0.227436
Left censored observations	8616
Right censored observations	343
Uncensored observations	4235
Total observations	13194

Note: QML (Huber/White) standard errors are reported. *** – variable is significant at 1%; ** – variable is significant at 5% level.

following explanation for this phenomenon. From 2001 till 2004 export-orientedness in the control group increased with higher rates than in the treatment group, but the EU enlargement changed this situation to the opposite one. Thus, the positive effect of trade liberalization connected with the joining EU is quite large.

The coefficients near the other variables are mostly consistent with theoretical predictions. Firms with medium employment tend to export more and firms with high employment have even higher export-orientedness (the difference is significant with 0.0009 *p*-value). In the sales category I chose firms with the lowest annual sales (less than $10 thousand) as the basic one. Although the coefficient near sales $10-$99,000 is negative and insignificant (the most likely because of the small sample), the coefficients for sales $100-$999,000, $1-9.99 million; $10 million or more are positive and significant as expected. Surprisingly, the coefficient for the dummy variable indicating the firms with the largest sales is smaller (significantly, *p*-value of Wald test is 0.0011) than the coefficient near the dummy indicating second largest sales category.

The coefficients near the ownership dummies confirm suggested hypothesis: both of them are positive and significant. Thus, a private firm with the same other characteristics tends to be more export-oriented than the state-owned one and a firm with foreign ownership is likely to export more than the domestic firm.

For industry sectors I chose the manufacturing as the basic category. The estimation results show that the firms in this industry are the most export-oriented. The second most export-oriented are the enterprises operating in transport and communication sector following by those operating in mining. However, the difference between mining and transport industries appears to be statistically insignificant (*p*-value of Wald test is 0.22 only), as well as between hotels and restaurants and real estate and other sectors coefficients near which are almost the same. Wholesale, retail, repair firms are even less export-oriented but the smallest

amounts of export have enterprises operating in construction industry. These results are mostly consistent with specificity of different sectors.

The coefficients near year dummies show that there is some general tendency in export-orientedness of the firms. Actually, the positive and significant coefficient near the variable *year*2001 and insignificant coefficient near year2004 variable show that if the employment, sales, ownership and industry structure of firms for the second and the third period did not change, the overall export-orientedness should have fallen. Another explanation of this result is the fact that all the sales dummies were reported in the value of the currency at that particular period, so that the same sales in 2004/2008 have different effect on firms' export-orientedness. In fact, in the unreported here regression model were I allowed the firm's sales to have different impact on its export the year dummies are no longer significant, while the effect of other variables (including *eujoined*2001, *eujoined*2004 and *eujoined*2009 dummies) does not change.

The results of investigating the contribution of extensive margin on the observed increasing of trade are reported in Table 10. Since the dependent variable is a dummy, I use binary choice probit model. The overall results are very similar to those obtained for the first equation. The average number of firms exporting for the treatment and control groups did not differ significantly in the first period; in the year 2004 the probability of firm to be exporter in the EU sample was significantly lower, but till the last observation period this probability became significantly higher. Thus, I can conclude that the extensive margin has a large effect on overall export tendency during observed period. The effect of other variables on the firm' probability to be exporter is roughly the same as their effect on firm' percentage of sales exported. There is only some small divergence in different sectors effect, but they do not change general picture. One more thing to note is that the difference in effects of the largest

Table 10: The Determinants of Firm's Probability to be Exporter (calculated using binary probit (Quadratic hill climbing) method).

Dependent Variable: EXPORT	
Variable	Coefficient (Standard Error)
EUJOINED2001	0.015114 (0.045585)
EUJOINED2004	-0.181736*** (0.031763)
EUJOINED2008	0.141225*** (0.035646)
EMPLOYMENT_MEDIUM	0.371183*** (0.032514)
EMPLOYMENT_HIGH	0.496417*** (0.047779)
SALES_100K	-0.154232 (0.188157)
SALES_1000K	0.475396*** (0.183878)
SALES_10000K	0.831635*** (0.185338)
SALES_10000K_MORE	0.795362*** (0.187129)
IND_CONSTRUCTION	-1.197020*** (0.049627)
IND_HOTELS_AND_RESTAURAN	-0.903835*** (0.064007)
IND_REAL_ESTATE_AND_OTHE	-0.732787*** (0.047411)
IND_TRANSPORT_AND_COMMUN	-0.217018*** (0.052137)
IND_WHOLESALE_RETAIL_REP	-0.867484*** (0.030521)
IND_MINING	-0.246588*** (0.075355)
OWNERSHIP_PRIVATE	0.173550*** (0.047484)
OWNERSHIP_FOREIGN	0.512335*** (0.041727)
YEAR2001	0.245181*** (0.044617)
YEAR2004	0.069196** (0.034482)
C	-0.944021*** (0.192864)
Log likelihood	-6958.079
McFadden R-squared	0.183079
Observations with Dep=0	8616
Observations with Dep=1	4578
Total observations	13194

Note: QML (Huber/White) standard errors are reported. *** – variable is significant at 1%; ** – variable is significant at 5% level.

($10 million and more) and the large ($1-9.9 million) sales on the probability of exporting is not significant.

The results of the estimation of the third equation are reported in Table 11. The estimation methodology and all the variables are the same as in the first equation; the difference is that the sample is restricted for those firms that export only. The results, however, differ significantly from the previous equations. Coefficients near the EU dummies are insignificant for all periods. It means that, other factors fixed, the average firm-exporter in the EU countries does not tend to export higher percentage of its sales than the exporters in the non-EU countries.

The other important difference from previous equations is that the size of the exporter in terms of sales does not influence its fraction of export, though the effect of employment size stays significant and positive. The impact of different industry sectors has also changed, while ownership structure effects are precisely the same as those for 2 previous equations. The year dummies show that for the whole sample of exporters the average export percentage significantly increased in the last period, while in the year 2001 and 2004 it was precisely the same.

The finding that more firms in the countries that joined the EU start to export, while there is no evidence that an average exporter started to export larger fraction of its sales, may have different explanations. Assuming that there are fixed and variable costs of exporting, I can suggest that trade liberalization as the consequence of the EU enlargement resulted in decreasing fixed cost of exporting. In this case new firms can enter foreign market and start to export their production, while those firms that were exporters before their countries joined the EU had already exploited foreign market and therefore did not gain from this trade liberalization. This finding is consistent with that fact that the future EU members started to eliminate trade barriers with the other EU countries in the period before the accession, which

Table 11: The Determinants of Average Percentage of Export (calculated using Censored Normal (TOBIT) (Quadratic hill climbing) method)

Dependent Variable: EXPORT_TOTAL	
Variable	Coefficient (Standard Error)
EUJOINED2001	1.163820 (1.866748)
EUJOINED2004	0.959621 (1.428097)
EUJOINED2008	-2.027433 (1.514744)
EMPLOYMENT_MEDIUM	7.592129*** (1.382168)
EMPLOYMENT_HIGH	12.24588*** (1.900065)
SALES_100K	2.846037 (9.319458)
SALES_1000K	8.903878 (9.056205)
SALES_10000K	6.783705 (9.015686)
SALES_10000K_MORE	0.398985 (9.059416)
IND_CONSTRUCTION	-23.72892*** (1.899034)
IND_HOTELS_AND_RESTAURAN	2.288600 (3.044341)
IND_REAL_ESTATE_AND_OTHE	-22.26180*** (1.888085)
IND_TRANSPORT_AND_COMMUN	3.814276* (2.032832)
IND_WHOLESALE_RETAIL_REP	-20.59001*** (1.312424)
IND_MINING	-1.891730 (3.238705)
OWNERSHIP_PRIVATE	5.641697*** (1.820837)
OWNERSHIP_FOREIGN	15.54820*** (1.535710)
YEAR2001	-5.030238*** (1.875148)
YEAR2004	-6.324559*** (1.474999)
C	33.83937*** (9.217843)
Sigma	34.40858*** (0.335565)
Adjusted R-squared	0.121620
Left censored observations	0
Right censored observations	343
Uncensored observations	4235
Total observations	4578

Note: QML (Huber/White) standard errors are reported. *** – variable is significant at 1%; * – variable is significant at 10% level.

can be considered as a decline in variable costs of exporting. Conversely, the joining to the EU itself may have caused decreasing of indirect (fixed) costs of trade, like expenditures on searching opportunities to export.

However, since the data I use do not provide information whether an arbitrary firm had been en exporter before its country joined the EU in 2004, the observed fact may have different explanation. It may be that firms which already participated in the foreign trade indeed increase its percentage of sales exported, but new exporters start from selling a small part of their sales abroad. In such a case the two effects could compensate for each other resulting in the fact that there is no difference in average value of sales exported. Such a hypothesis is correct if new entrants on the international market need time in order to exploit it in the proper way. Thus I cannot reject or confirm the hypothesis that the EU accession did not contribute to the increase of the export by intensive margin, although there is evidence in its favor. Acquiring more appropriate data, preferably, long panel data sample, could solve this problem.

Conclusion

In my work I tested the hypothesis that there is a positive effect of the joining the EU on export of the firms operating in the countries that joined the EU. Using micro-level data I estimated the difference between export of enterprises in the EU from 2004 and non-EU countries. For obtaining the exact effect of this event, I controlled for other firms characteristics – sales, employment, industry and ownership. In order to account for cross-country endogeneity I estimated the difference in export between them for three periods – before the accession (2001), at the accession (2004) and after the accession (2008). Finally, I decomposed the effect into extensive and intensive margins.

The empirical results revealed that there was a significant increase in total export on the firms operating in the countries that joined the EU on 1 May 2004. The decomposition of this effect on the extensive and intensive margin showed that such an increase was due to a growth in number of firms exporting, whereas the average percentage of export among exporters did not change significantly. Thus, the effect of trade liberalization connected with joining the EU definitely comes from the extensive margin of trade, while the impact of intensive margin is ambiguous due to the lack of appropriate data. These findings are the evidence in favor of the fact that the EU accession lowers fixed costs of exporting.

The natural extension of the work would be performing the same analysis with long panel data set of firms, since it provides a possibility to control for firms' fixed effects and should produce more precise results. The investigation of the same effect for the other countries joining to the EU, like Romania and Bulgaria in 2007, would also be interesting and could test the robustness of my results.

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