Trade-Enhancing EU Enlargement and the Resurgence of East-East Trade

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This article uses the episode of EU enlargement in 2004 as a natural experiment to identify the trade effect of declining border barriers across otherwise well integrated markets. Despite the fact that traditional trade policy measures (tariffs, quantitative restrictions) were already eliminated for most industrial goods in trade between the pre-enlargement EU-15 countries and eight of the countries that entered the EU in 2004 (EU-8)[2] as well as among the EU-8 themselves, EU enlargement is shown to have caused a significant trade creation. The effect was most pronounced for trade among EU-8 countries, with a magnitude of 4% to 9% in ad valorem tariff-equivalent terms. Technology-intensive industries benefitted most strongly from enlargement, and a significant anticipatory effect can also be detected for 2003. These findings highlight the importance of non-policy related border barriers to trade and may also prove useful in assessing the potential for trade integration in the current EU candidate countries.

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1 Introduction

The existence of national borders constitutes an important trade barrier. Even for free trade areas with strong economic integration, trade within a nation is larger than trade across borders. Anderson and van Wincoop (2003) found that trade among Canadian provinces was by a factor of six larger than trade across the U.S. border. Several studies (Nitsch (2000), Head and Mayer (2000) or Chen (2004)) found that, despite their close integration, similarly large border effects existed for the 15 EU Member States prior to EU enlargement (EU-15).

What constitutes the "border effect" is still in the focus of international trade research. Apart from the traditional trade policy measures like tariffs and quotas, the existence of national borders may divert trade through several channels, ranging from differences in product standards or administrative burdens to sometimes largely hidden cultural differences. Such barriers can affect trade not only in a direct way, but also indirectly through the endogenous location of firms: Firms agglomerate to minimize the cost of trade, thus contributing to the increase in intranational relative to international trade.

The entry of the five Central and Eastern European countries and the three Baltic countries (hereinafter EU-8) into the European Union in 2004 provides a reasonably good case for a natural experiment to infer the importance of border barriers across otherwise well integrated markets. Since free trade had been established between the EU-15 and the EU-8 and among the EU-8 countries for most manufactured goods well before enlargement, the trade effect of EU enlargement can be attributed to elements of diminishing border effects that are different from traditional trade policy measures.

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[2] *Namely the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia.*

Despite the numerous earlier studies on the effects of the trade liberalization processes of the 1990s and early 2000s,[3] evidence on the effect of the 2004 enlargement has so far been extremely rare. Antimiani and Costantini (2010), for example, analyze the trade developments around EU enlargement in a dynamic gravity framework, with a special focus on the technological upgrading of trade structures. They find evidence that EU accession brought a change in the export structure of the EU-8 toward more high-technology products.

Exploiting the episode of the 2004 accession as a natural experiment, this paper estimates the magnitude of the trade effect of EU enlargement. The estimation is based on a difference-in-difference strategy, where the treatment group involves country pairs with at least one EU-8 country and the control group contains EU-15 country pairs. Results reveal that the trade-creating effect in the first three years after enlargement is around 14%, which is consistent with a hypothetical 1.5% to 3.3% ad valorem tariff reduction. In other words, bilateral exports accelerated as if ad valorem tariffs in the export markets went down by 1.5% to 3.3%.

When allowing for varying treatment effects across country pair groups (trade within the EU-8, exports from the EU-8 to the EU-15, and exports from the EU-15 to the EU-8) estimates for trade within the EU-8 are by far the highest. The tariff equivalent for export growth within the EU-8 is estimated to be in the range of 4% to 9%, which is similar in magnitude to the total tariff reductions during the trade liberalization process of the 1990s. The effect is also sizeable and significant for exports from EU-8 to EU-15 countries, while often not different from zero for EU-15 to EU-8 exports.

Moreover, a significant anticipatory effect is identified for the immediate pre-accession year. Such an effect is justified by the fact that the decision on enlargement had been known already in 2003. Industry-specific estimates reveal that almost all technology-intensive industries (NACE 30 to 34) recorded a significant effect, though some other industries (such as "Basic metals") were also important contributors to the overall effect.

The remainder of the paper is structured as follows: Section 2 briefly discusses the pre-accession trade integration process. Section 3 presents basic stylized facts. Section 4 describes the empirical strategy, formulates the estimating equation and discusses issues on the timing of the trade effect of enlargement. Section 5 presents the results, complemented with placebo experiments and robustness checks. Section 6 provides a summary discussion, pointing out possible causes for the enlargement effect.

2 The European Trade Liberalization Process

The EU-8 countries had undergone a massive trade liberalization process already prior to EU accession. The Europe Agreements, which were signed between the EU and each of these countries mostly in the first half of the 1990s, granted mutual market access free of duties and quantitative restrictions for all nonagricultural

[3] *Numerous gravity studies estimated the current and potential level of trade integration between the EU-15 and the EU-8 countries before EU enlargement. See e.g. Bussiére et al. (2005), De Benedictis et al. (2005) and Herderschee and Qiao (2007).*

products.[4] At the same time, the free trade of manufactures was also extended to trade within the EU-8 itself by the formation of the Central European Free Trade Agreement (CEFTA) and the Baltic Free Trade Agreement (Baltic FTA).[5] Finally, free trade among the CEFTA and Baltic countries was established by several bilateral trade agreements which entered into force sequentially during the second half of the 1990s.[6] CEFTA, the Baltic FTA and the bilateral free trade agreements basically extended the Europe Agreements to bilateral trade within the EU-8.[7]

Meanwhile trade of the EU-8 countries with third countries was subject to individual national trade policies up until 2004, when the EU-8 had to apply the common external trade policy of the European Communities. Third-country tariffs of most CEFTA members before EU accession were higher than the level of common EU external protection, while those of the Baltic countries were lower. Hence, with EU accession the CEFTA countries had to decrease and the Baltic countries had to increase their third country tariffs, which – apart from having an effect on trade with third countries – might have influenced the trading patterns within the enlarged EU as well.

Against this background, one can conclude that – apart from changes in trade restrictions vis-à-vis third countries – EU enlargement brought no further trade liberalization with respect to the traditional trade policy measures within the now-enlarged EU.

3 Trade Developments around Enlargement

In the following, basic raw data evidence on the developments of trade flows around 2004 is documented. The dataset contains annual bilateral export flows in the nine years from 1999 to 2007.[8] The range of products is restricted to a subset of manufactures (corresponding to around 80% of all trade flows) which was freely traded throughout the whole sample.[9] 22 countries are considered: 14 countries of the EU-15 (Greece is omitted because its late euro area entry may complicate matters) and the EU-8 countries.

[4] *The so-called Interim Agreements, which regulated the removal of trade barriers, entered into force in 1992 with the Czech Republic, Hungary, Poland and Slovakia, in 1995 with the three Baltic countries, and in 1997 with Slovenia, and remained in force until their EU accession in 2004. In the first couple of years after the agreements entered into force, the removal of restrictions was asymmetric: While the elimination of import duties was immediate for goods from the EU-8 to the EU-15, it was subject to a three-year (five-year in the case of textiles and clothing) phase-in period for goods from the EU-15 to the EU-8.*

[5] *CEFTA was formed in 1993 by the Czech Republic, Hungary, Poland and Slovakia, with Slovenia joining in 1996. The Baltic FTA was established in 1994 by Estonia, Latvia and Lithuania.*

[6] *See Herderschee and Qiao (2007) for exact dates of bilateral FTAs.*

[7] *A further step toward free trade was the establishment of the pan-European system of rules of origin with diagonal cumulation in 1997 across the whole region consisting of the EU, CEFTA, the Baltic FTA and the European Free Trade Association (EFTA).*

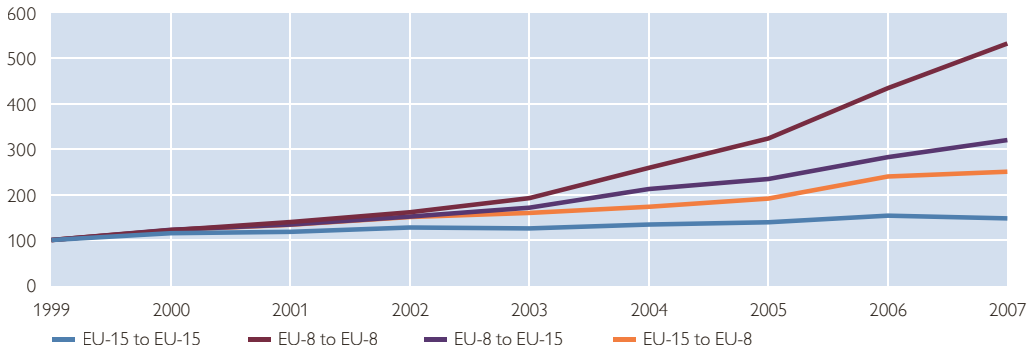
[8] *Trade data either stem from the Eurostat Comext or the United Nation's Comtrade database and are reported in euro value terms. Exports rather than imports were chosen mainly in order to decrease the possible statistical distortions due to VAT fraud activities of trading enterprises.*

[9] *Manufactured goods excluding food, beverages and tobacco (NACE groups 15 and 16) and coke, refined petroleum products and nuclear fuel (NACE 23).*

Chart 1

Export Value Flows in Different Relations

1999=100

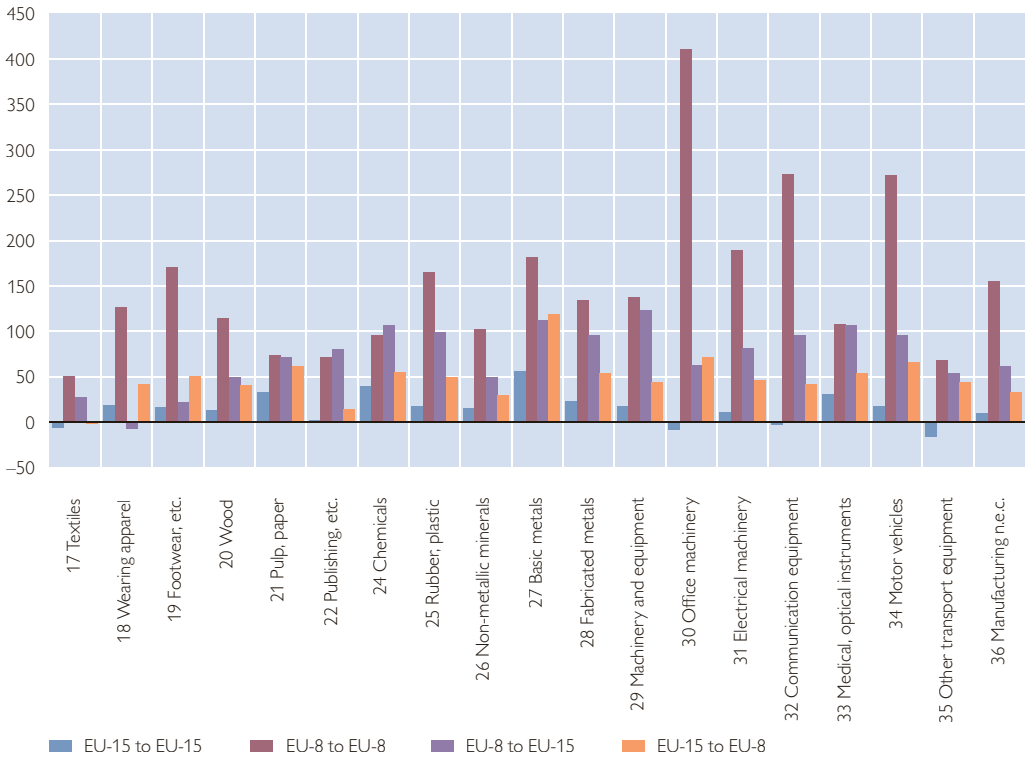


Source: Eurostat, UN Comtrade, author's calculations.

Chart 2

Export Growth by Branches

Growth of period averages from 2000–2003 to 2004–2007, %



Source: Eurostat, UN Comtrade, author's calculations.

Four country pair groups are differentiated: trade within the EU-15 (denoted as EU-15 to EU-15), trade within the EU-8 (EU-8 to EU-8), exports from the EU-8 to the EU-15 (EU-8 to EU-15) and vice versa (EU-15 to EU-8). A first look at export flows reveals strong trade creation on the part of the EU-8 countries following enlargement. Most apparently bilateral export flows within the EU-8

and, to a lesser extent, between the EU-8 and EU-15 countries accelerated after 2004. In contrast, exports within the EU-15 remained relatively stable.

The differences in the growth rates across country pair groups are also evident for individual industries. Exports in trade relationships that contain at least one EU-8 country, and especially trade within the EU-8, grew considerably faster than trade within the EU-15. This is found for all industries, although to a varying extent. The most remarkable increase occurred in trade within the EU-8 of office machinery, communication equipment and motor vehicles, the export value of which in the four years from 2004 to 2007 was by 300% to 400% larger than in the four years from 2000 to 2003.[10]

4 Measuring the Effect of EU Enlargement

In the following, I measure how much of this apparent boost in trade flows can be attributed to EU enlargement itself. The identification of the trade-enhancing effect is based on a difference-in-difference strategy and the estimation is carried out within a gravity model framework. The application of the gravity model to a panel dataset requires a disclaimer: As the gravity model is set up for the steady state, a panel data application needs to assume that the gravity equation holds for each time period. The analysis is therefore a comparative statics exercise.

4.1 The Difference-in-Difference Estimation Strategy

I take the episode of EU enlargement as a quasi natural experiment where the treatment group includes country pairs of which at least one country was not an EU member before enlargement (EU-8 to EU-8, EU-8 to EU-15, EU-15 to EU-8), while the control group includes EU-15 country pairs. The time period under observation is divided into pre-accession and post-accession years.

The corresponding treatment effect is derived from the change in exports for the treatment group from the pre- to the post-accession years relative to the similar change in exports for the control group. Formally, the treatment effect in logarithmic terms is

$$\left(x_{t=1}^{treatment} - x_{t=0}^{treatment}\right) - \left(x_{t=1}^{control} - x_{t=0}^{control}\right)$$

where x is the logarithm of exports and $t=0$ and $t=1$ denote the pre- and post-accession periods, respectively.

Taking the EU-15 country pairs as the control group rests on the assumption that their export dynamics (the change from the pre- to the post-accession period) is not affected by EU enlargement. This assumption may be justified by the raw data evidence that exports within the EU-15 were quite stable during the sample period. Also, for the difference-in-difference setup, the treatment and control groups should be sufficiently similar or at least heterogeneity should be appropriately controlled for. The EU-15 and EU-8 countries are close to each other geographically and, at least at the time covered in this sample, had become sufficiently close institutionally. Nevertheless, the two groups are far from being

[10] *The strong growth of exports in these typically high value/low volume goods requires closer examination, because this category contains the products which are most prone to be subject to VAT fraud. Robustness checks below ensure that the results are qualitatively unaltered after removing the suspicious items.*

homogeneous. Controlling for their differences – most notably differences in the real convergence trends and in third country trade protection changes – becomes an important issue in this analysis.[11]

4.1 The Anderson and Van Wincoop Gravity Equation

In order to fully account for the factors that affect international trade, I resort to the gravity theory of Anderson and Van Wincoop (2003), a workhorse trade model. The model assumes identical constant elasticity of substitution (CES) preferences and differentiated goods by place of origin, i.e. every country is specialized in the production of one good. The supply side of the model is fixed. Prices differ between locations only due to trade costs, which are not observable directly. Under the assumption that all bilateral trade costs are symmetric and markets clear, the gravity equation in logarithmic form and for time t becomes

$$x_{ijt} = y_{it} + y_{jt} - y_t^W + (1-\sigma)t_{ijt} - (1-\sigma)\pi_{it} - (1-\sigma)p_{jt}$$

where x_{ijt} is the logarithm of exports from country i to country j in year t, y_{it} and y_{jt} are the logs of output levels in the exporting and importing countries in the same year, respectively, y_t^w is world output, t_{ijt} is the log of the bilateral trade barriers between the exporting and the importing countries and σ is the elasticity of substitution between all goods.

The terms π_{it} and p_{jt} are the logarithms of the so-called multilateral trade barriers for the exporting and the importing country, respectively. More precisely, π_{it} is a measure of trade barriers that country i's exports face in the rest of the world, while p_{jt} is a measure of trade barriers that country j imposes on imports from the rest of the world. Introducing the multilateral trade barriers into the gravity equation is an important novelty of the model of Anderson and Van Wincoop relative to earlier models. Bilateral trade barriers matter for trade only in relative terms, i.e. in relation to the level of multilateral trade barriers. An increase in bilateral trade barriers ceteris paribus reduces bilateral trade, while an increase in the trade barriers vis-à-vis the rest of the world for either the exporter or the importer ceteris paribus increases it.

4.2 The Estimating Equation

The difference-in-difference strategy is carried out by performing a fixed-effects estimation of the gravity equation, where the treatment effect is captured by a dummy variable taking value 1 for treated country pairs and years. To make the gravity equation operational for estimation purposes, I need to solve two issues.

First, it is necessary to assume some form for the log of the bilateral trade barrier (t_{ijt}) term. As it is normally assumed, I take t_{ijt} to be a linear function of different trade barrier components.

[11] *An ideal control group would include countries which have gone through the same process of preparation for EU accession, but did not enter the EU in 2004. The closest examples are Bulgaria and Romania. Using them as a control group is, however, problematic – not only because of the small number of observations, but also because of the fact that their would-be accession in 2007 was decided in 2004, which could have initiated some anticipatory trade effect early on.*

$$t_{ijt} = \delta_1 Z_{ij} + \delta_2 EU_{ijt} + \delta_3 EA_{ijt} + \varepsilon_{ijt}$$

The first term (Z_{ij}) denotes all the time-invariant determinants of trade costs, including distance and other typical gravity variables like common border, common language, common historical ties. They become unimportant in this analysis, since the country pair-fixed effects fully control for all time-invariant factors. EU_{ijt} is the treatment dummy; it takes the value of 0 in the pre-accession years for all country pairs and the value of 1 in the post-accession years for the treatment country pairs.

$$EU_{ij,t=0} = 0$$

$$EU_{ij,t=1} = \begin{cases} 0 & if \quad control \\ 1 & if \quad treatment \end{cases}$$

EA_{ijt} captures euro area membership, which is time varying only due to Slovenia's adoption of the euro in 2007.[12] An error term ε_{ijt} enters the expression, accounting for the fact that some bilateral trade barriers are not observed or are proxied by the above variables with an error.

The second step is to tackle the problem that the two multilateral trade barrier terms in the gravity equation (π_{it} and p_{jt}) are not observable. If they remain in the error term and are correlated with some of the right-hand-side variables, they may cause an omitted-variable bias in the estimates.[13] Country pair-fixed effects control for the time-invariant part of the multilateral trade barriers, but not for the time-varying one. In order to control for the time-varying part, I opt for the solution to include additional control variables, namely third country tariffs and real effective exchange rates.[14]

The estimating equation, after substituting the trade cost function, becomes

$$x_{ijt} = \gamma_{ij} + \delta_t + \beta_1 gdp_{it} + \beta_2 gdp_{jt} + \beta_3 EU_{ijt} D_{ij} + \beta_4 EA_{ijt} + \beta_5 tar_{it} + \beta_6 tar_{jt} + \beta_7 reer_{it} + \beta_8 reer_{jt} + u_{ijt}$$

On the left-hand side, x_{ijt} is the log of bilateral exports in euro value terms. On the right-hand side, the (direction-specific) country pair-fixed effects (γ_{ij}) control for all time-invariant factors, and year dummies (δ_t) control for common business cycle trends. gdp_{it} and gdp_{jt} are the logs of nominal GDPs, for which, as it is customary in empirical gravity studies, nonunitary coefficients are allowed.

The EU treatment dummy enters the equation in a way that allows for estimating both common and varying treatment effects. The term $EU_{ijt}D_{ij}$ is the interaction of the treatment dummy and a set of dummy variables (D_{ij}) indicating which group (EU-8 to EU-8, EU-8 to EU-15, EU-15 to EU-8) the treatment country

[12] *In other applications, bilateral tariffs or quotas, as other important observable trade barriers, may also be part of the trade cost function. In the current exercise, however, the trade flow is restricted to products for which tariffs and quantitative restrictions were already eliminated.*

[13] *Such fears are highly realistic since, as Anderson and Van Wincoop (2003) show, the multilateral trade resistance terms are functions of all the bilateral trade barriers with countries in the rest of the world.*

[14] *Baldwin and Taglioni (2006) suggest that a full set of country-specific time dummies should be included. In general, a drawback of this approach is that it involves a lot of dummies to be estimated and, hence, a significant degree of freedom loss. Moreover, in the varying treatment case identification is infeasible with country-specific time dummies, as they are perfectly collinear with the treatment dummies.*

pair belongs to. Estimating a common EU effect is the special case when $D_{ij}=1$ for all treatment country pairs. The varying treatment effect gives separate EU effect estimates for each of the three country pair groups, while the common treatment effect is an average across all treatment country pairs.

The two variables that are meant to control for the time-varying part of the multilateral trade barriers are the third country average tariff rates (tar_{it}, tar_{jt}) for both the exporting and importing countries and their real effective exchange rates ($reer_{it}$, $reer_{jt}$). Real effective exchange rates can also control for differences in the real convergence trends of individual countries.

4.3 Timing Issues

When identifying the trade effects of accession, one needs to have a view on when exactly these effects are likely to appear. Considering such timing issues brings up four considerations to the current analysis:

1. EU enlargement occurred in the middle of the year, on May 1, 2004. Having annual frequency data, one needs to decide how to treat the year 2004.
2. The data only allow for analyzing the first three years after accession. This naturally restricts the measured effect to being only of a short-term nature. Firms responding to the reduction in trade costs need time to adjust their production, build up new capacities or redirect their sales to new markets. Some of these responses may appear already in the first months, while others might take several years to unfold.
3. It cannot be ruled out that there was some early trade effect in anticipation of accession, since decisions on accession became certain already in 2003. On the part of the EU, the decision was made at the Copenhagen Summit in December 2002, which was followed by referendums in individual acceding countries during the following year. Against this background, one cannot exclude the possibility that part of the accession effect appeared already as early as in 2003.
4. The fourth potentially important timing issue relates to the late effect of earlier liberalization measures. Though most of the trade liberalization occurred until the millennium, the consequences – especially when considering the phase-in periods for abolishing import duties on EU-15 products in the EU-8 – may have unfolded only gradually. Hence, export growth rates around accession could still have been affected to some extent by these earlier liberalization measures.

I address the above timing issues in the following ways. In order to tackle the problem of the mid-year accession date, I keep only the odd years in the sample. Hence, the restricted dataset contains three years' data before (1999, 2001, 2003) and two years' data after accession (2005, 2007).

The three years of data before accession provide a possibility to test for the presence of anticipatory EU effects. This can be done by leading the treatment dummy with two years as if accession occurred in the period from 2001 to 2003.

In a similar way, a "placebo experiment" can also be carried out by leading the treatment dummy with four years as if accession occurred in the period from 1999 to 2001. The placebo experiment is a way to test the presence of a significant treatment effect for nontreated observations, i.e. in the current case, to test the presence of an EU effect in the period from 1999 to 2001, when no decisions on EU enlargement had been made yet. Only if the placebo effect is *not* significant

can I claim that the empirical strategy is well designed. Otherwise, it must be the case that the EU effect is blurred by some other factor(s). The placebo experiment is therefore a valid test for the fourth issue above.

5 Results

The estimation is carried out on a panel of annual export flows in euro value terms for the five odd years between 1999 and 2007. The number of direction-specific country pairs is (22*21=) 462, of which 182 is in the control group and 280 is in the treatment group. Among the right-hand-side variables, nominal GDP and real effective exchange rates (relative to 35 industrial countries and based on unit labor costs) are from Eurostat. Third country tariffs are the average applied tariff rates for all goods from the World Bank.

5.1 Aggregate Estimates

The main estimates for the EU effect are presented in table 1 either with common treatment (columns 1 and 2) or varying treatment (columns 3 and 4). The two-year lead of the treatment, EU(+2), intends to capture an anticipatory accession effect. In this case the EU dummy for the treatment group takes the value of 1 already in 2003.

Table 1

Aggregate Estimation Results

Variable	Common treatment		Varying treatment	
EU	0.133***	0.071**		
	[0.041]	[0.035]		
EU_8-8			0.357***	0.298***
			[0.087]	[0.079]
EU_8-15			0.264***	0.165***
			[0.056]	[0.047]
EU_15-8			0.038	0.000
			[0.053]	[0.046]
EU(+2)		0.122***		
		[0.032]		
EU(+2)_8-8				0.167***
				[0.059]
EU(+2)_8-15				0.218***
				[0.051]
EU(+2)_15-8				0.066**
				[0.033]
Gravity variables	yes	yes	yes	yes
Country pair-fixed effects	yes	yes	yes	yes
Common year effects	yes	yes	yes	yes
Number of observations	2,310	2,310	2,310	2,310
Number of groups	462	462	462	462
Within R-squared	0.66	0.66	0.67	0.67

Source: Author's calculations.

*Note: Robust standard errors (in brackets) are adjusted for clustering at the direction-specific country pair level. The sample includes every odd year between 1999 and 2007. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.*

The coefficient on the common EU dummy shows a 14% acceleration of trade for the treatment group, i.e. for all country pairs that contained at least one EU-8 country.[15] When accounting for a possible anticipatory effect it turns out that a considerable part of this increase occurred already in 2003. The differences between the common and the varying treatments reveal a strong country-specific nature of the EU effect. The relatively moderate common effect masks a large effect for trade within the EU-8 and, to a lesser extent, for exports from the EU-8 to the EU-15, while no significant effect is detected for exports from the EU-15 to the EU-8. The coefficient for trade within the EU-8 is around 0.35, i.e. it shows a more than 40% increase in the value of bilateral exports following EU enlargement. Although this group also experienced a significant anticipatory effect, its magnitude is only half of the measured post-accession acceleration. The EU effect for exports from the EU-8 to the EU-15 is somewhat lower (30%) than for EU-8 pairs, with an anticipatory effect of a similar magnitude.

The estimate on the EU effect can be decomposed as $\beta_3=(1-\sigma)\delta_2$, i.e. the product of one minus the elasticity of substitution and the effect of EU enlargement on bilateral trade costs. The latter is here expressed as a so-called "ad valorem tariff equivalent," i.e. the magnitude of a hypothetical tariff reduction that would have generated the same trade creation as EU enlargement did. Assuming that σ falls in the range of 5 to 10, the estimated ad valorem tariff equivalent of not being EU members at the same time ranges from 1.5% to 3.3% according to the common treatment estimate.[16] For trade within the EU-8 the same measure gets as large as 4% to 9%.

Tables 4 and 5 give a more detailed presentation of the estimation results, including estimates for the coefficients of the other gravity variables. The coefficients on the GDP variables are, as expected, in most of the cases around or above unity. The coefficients of the third country tariff variables are significant with the expected sign only in shorter sample estimations. In contrast, coefficients on the real exchange rate variables are strongly significant and negative in most of the regressions.[17]

5.2 Industry Estimates

I carry out the estimation for each of the 19 NACE manufacturing industries separately. The estimating equation is modified as follows. Instead of the country GDPs, I use industry gross output for both the exporting and the importing countries. In addition, however, the importer's total GDP is also added in order to account for the fact that products of an industry are also purchased by other sectors of the economy.[18] Apart from these changes the estimation is the same as before. The estimated common treatment effects and their ad valorem tariff equivalents

[15] *Percentage change = 100 (exp(coeff)–1).*

[16] *Anderson and Van Wincoop (2004) assess the literature on the empirical estimates of the elasticity of substitution and put σ within the range of 5 to 10.*

[17] *This negative effect mainly reflects a valuation effect: If the exchange rate of countries not in the euro area appreciates, the value of their trade in euro should decrease for simple accounting reasons, unless their trade pricing is fully in euro.*

[18] *Industry gross output data stem from Eurostat.*

Table 2

Industry-Level Common Treatment Results (coefficient estimates and ad valorem equivalent effects)

Industry (NACE codes)	Coefficient	Standard error	Effect (%, σ=8)	Effect (%, industry σ)	Industry σ
17 Textiles	0.082	[0.064]	–1.2	–1.3	7.3
18 Wearing apparel	–0.098	[0.110]	1.3	1.9	5.7
19 Leather, luggage, footwear, etc.	0.052	[0.127]	–0.7	–0.8	7.3
20 Wood, except furniture	–0.056	[0.094]	0.7	1.8	3.8
21 Pulp, paper products	0.144	[0.118]	–2.1	–4.3	4.4
22 Publishing, printing and reproduction of recorded media	0.468***	[0.114]	–6.7	–11.3	5.1
24 Chemicals and chemical products	0.277***	[0.092]	–4.0	–4.5	7.2
25 Rubber and plastic products	0.133**	[0.068]	–1.9	–3.2	5.2
26 Other non-metallic mineral products	0.063	[0.082]	–0.9	–3.2	3.0
27 Basic metals	0.621***	[0.116]	–8.9	–24.5	3.5
28 Fabricated metal products	0.069	[0.084]	–1.0	–1.8	4.9
29 Machinery and equipment n.e.c.	0.124	[0.079]	–1.8	–2.0	7.2
30 Office machinery and computers	0.325**	[0.161]	–4.6	–3.3	10.9
31 Electrical machinery and apparatus	0.564***	[0.086]	–8.1	–11.2	6.0
32 Radio, television, communication equipment	0.630***	[0.150]	–9.0	–12.9	5.9
33 Medical, precision and optical instruments	0.401***	[0.087]	–5.7	–7.2	6.6
34 Motor vehicles, trailers and semi-trailers	0.519***	[0.177]	–7.4	–8.3	7.3
35 Other transport equipment	–0.078	[0.199]	1.0	1.1	7.4
36 Furniture, manufacturing n.e.c.	–0.066	[0.117]	0.9	2.0	4.1

Source: Author's calculations.

*Note: Robust standard errors (in brackets) are adjusted for clustering at the direction-specific country pair level. The sample includes every odd year between 1999 and 2007. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. Industry σ estimates are from Hummels (2001).*

are reported for each industry in table 2.[19] Tariff equivalents are calculated by either assuming σ=8 or by taking the industry-specific σ estimates of Hummels (2001).[20]

Significant and large positive EU effects are found for most of the technology-intensive industries (NACE 30 to 34) such as "Radio, TV, communication equipment," "Electrical machinery" or "Motor vehicles." Large effects are detected also for "Basic metals" (27), "Publishing and printing" (22) and "Chemicals" (24). In the case of motor vehicles, for instance, the estimated common treatment effect is around 0.5, consistent with a 65% growth in exports and a 7% to 8% hypothetical tariff reduction. The varying treatment estimates in table 3 reveal that this effect stems almost entirely from increased exports of the EU-8 countries to both EU-8 and EU-15 markets.

[19] *Estimates for the anticipatory effects are available upon request.*

[20] *Hummels (2001) estimates the elasticity of substitution for a two-digit SITC product breakdown. Estimates are transformed to the four-digit NACE industry classification by Chen and Novy (2009). The reported industry σ's at the two-digit industry level are weighted averages of the four-digit figures, where weights are based on intra-EU export shares.*

Table 3

Industry-Level Varying Treatment Results (ad valorem equivalent effects)

Industry (NACE codes)	EU-8 to EU-8		EU-8 to EU-15		EU-15 to EU-8	
	Effect (%, σ=8)	Effect (%, industry σ)	Effect (%, σ=8)	Effect (%, industry σ)	Effect (%, σ=8)	Effect (%, industry σ)
17 Textiles	–2.4	–2.6	–3.6***	–3.9***	2.9**	3.2**
18 Wearing apparel	3.3	4.9	2.6	3.8	–0.6	–0.9
19 Leather, luggage, footwear, etc.	–9.0**	–10.0**	0.6	0.6	–2.6	–2.9
20 Wood, except furniture	–3.9*	–10.0*	–1.0	–2.5	2.6	6.5
21 Pulp, paper products	2.0	4.1	–2.9	–6.0	–0.7	–1.5
22 Publishing, printing and reproduction of recorded media	–4.0	–6.7	–13.0***	–22.1***	1.3	2.2
24 Chemicals and chemical products	–2.9	–3.3	–7.0***	–7.9***	0.1	0.2
25 Rubber and plastic products	–3.6**	–6.0**	–5.9***	–9.9***	2.1*	3.6*
26 Other non-metallic mineral products	–1.3	–4.6	–4.5***	–15.7***	2.7*	9.5*
27 Basic metals	–17.6***	–48.6***	–9.9***	–27.3***	–6.8***	–18.7***
28 Fabricated metal products	–1.9	–3.5	–3.3*	–5.9*	1.1	2.1
29 Machinery and equipment n.e.c.	–3.8*	–4.3*	–5.5***	–6.2***	1.7	1.9
30 Office machinery and computers	–19.7***	–13.8***	–7.0**	–4.9**	–2.4	–1.7
31 Electrical machinery and apparatus	–11.1***	–15.4***	–10.7***	–14.9***	–4.4***	–6.1***
32 Radio, television, communication equipment	–15.2***	–21.8***	–11.2***	–16.1***	–5.1	–7.3
33 Medical, precision and optical instruments	–2.7	–3.4	–9.1***	–11.5***	–0.7	–0.9
34 Motor vehicles, trailers and semi-trailers	–16.0***	–17.9***	–14.8***	–16.6***	0.3	0.3
35 Other transport equipment	7.7	8.4	–0.5	–0.6	3.6	3.9
36 Furniture, manufacturing n.e.c.	0.1	0.3	–1.9	–4.2	4.4*	10.1*

Source: Author's calculations.

*Note: ***, ** and * denote significance of the underlying coefficient estimate at the 1%, 5% and 10% level, respectively. Industry σ estimates are from Hummels (2001).*

5.3 Placebo Experiment and Robustness Checks

I carried out a "placebo experiment" in order to check to what extent the estimates reflect the effect of EU enlargement alone. The placebo EU dummy is created as the four-year lead of the original EU dummy (EU(+4)). Tables 4 and 5 report the placebo estimates. The estimation is done on both the whole sample (column 3) and a sample comprising data until 2001 (column 5). In general, the placebo estimates are numerically small and not different from zero statistically. This suggests that the main results are most probably not driven by other sources of heterogeneity across country groups that could have been present even in the early years of the sample. Some discrepancy appears however in the varying treatment case, where the placebo effect is significantly different from zero at a 10% significance level for the EU-8 to EU-15 and the EU-15 to EU-8 groups.[21] No significant placebo effect is found, though, for EU-8 country pairs.

The main results remained qualitatively the same after carrying out several robustness checks. In order to control for the possible export-inflating effect of intra-EU trade-related VAT fraud, I carried out the estimations on a sample excluding the typically VAT fraud-sensitive products.[22] The results are basically unaltered. The analysis was also reproduced for export volumes and real GDPs, where exports were deflated by national producer price indices (from the IMF's

[21] *In the case of EU-15 to EU-8 exports, the significance can at least partly be explained by the end of the Europe Agreements' phase-in periods for eliminating import duties on EU-15 products in some of the EU-8 countries.*

[22] *I exclude the two-digit NACE categories 30 (Manufacturing of office machinery and computers), 32 (Manufacture of radio, television and communication equipment and apparatus), 33 (Manufacture of medical, precision and optical instruments, watches and clocks).*

IFS database). In this regression, the EU effects are somewhat larger and a significant effect is detected also for EU-15 to EU-8 trade. Finally, the results are robust to including dummies for countries neighboring Russia. Such a test is motivated by the boost in the Russian economy that characterized this period and could significantly alter the trade patterns of countries having close trade links with Russia.

6 Summary

This paper provides empirical evidence on the magnitude of the trade effect of EU membership by taking the episode of the 2004 enlargement as a quasi-natural experiment. It shows that the trade creation through EU enlargement can be sizeable even after tariffs and quantitative restrictions of trade have been completely removed. The effect was considerably larger for EU-8 than for EU-15 exports, i.e. exporters in countries entering the EU seemed to reap most of the gain. Moreover, EU enlargement reduced the technological gap between the EU-15 and the EU-8 economies, since trade of more technology-intensive industries grew fastest. Finally, part of the effect occurred as early as the announcement of prospective enlargement, as captured by a significant effect recorded in 2003.

Apart from highlighting the importance of nontraditional border barriers to trade in general, the results may also convey useful lessons for assessing the potential for trade integration in current and would-be EU candidate countries (the countries of the Western Balkans, Turkey and Iceland). The main lesson to be drawn is that their scope for trade integration with the EU and with each other can be considerably larger than what may follow (or what has followed so far) from explicit trade liberalization measures. In order to conjecture to what extent the above findings are applicable to future acceding countries, however, it is necessary, first of all, to be more specific about the causes of the trade effect. Possible factors for the increase in trade may be the following:

– A decline in the time cost of trading and the cost of customs administration. EU accession practically eliminated border waiting time and the entire customs procedures in intra-EU trade. The cost of border waiting time is not necessarily negligible if trading is frequent and/or several borders must be crossed.
– The further harmonization of technical barriers to trade. Even today, differences in national technical and labeling requirements are trade-distorting policy measures within the EU.[23] From 1997 onward, the EU-8 countries had been involved in the process of harmonizing these requirements through the so-called PECAs[24] although they had the possibility to postpone full implementation until the date of accession at the latest.
– Lower legal and informational cost for enterprises. The reduction in legal and informational costs due to the adoption of the acquis communautaire can facilitate cross-border trade and encourage the setting-up of businesses abroad. Although legal harmonization in the EU-8 had been a gradual process spanning more than one decade, the ultimate adoption of some parts of community legislation was most probably concentrated at the date of accession.

[23] *See e.g. Chen (2004) or Manchin and Pinna (2007) for empirical evidence.*

[24] *Protocols to the Europe Agreement on Conformity Assessment and Acceptance of Industrial Products.*

– Reduced political risk. A less well-defined, but presumably not the least important, source of cost reduction is the increased confidence in the political stability of the EU-8 region following their entry into the EU.

Many of these factors are not directly observable or very hard to quantify. Hence, explicitly assessing their individual importance in the total trade effect caused by EU accession is not a straightforward exercise and is out of the scope of this paper. It remains a subject for future research.

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Appendix: Tables

Table 4

Common Treatment Results

Variable				Sample until 2003	Sample until 2001
EU	0.133***	0.071**	0.076**		
	[0.041]	[0.035]	[0.035]		
EU(+2)		0.122***	0.095***	0.159***	
		[0.032]	[0.031]	[0.031]	
EU(+4)			0.058		0.054
			[0.037]		[0.049]
gdp_i	1.722***	1.644***	1.629***	1.085***	0.773**
	[0.167]	[0.173]	[0.175]	[0.210]	[0.370]
gdp_j	1.209***	1.135***	1.120***	0.931***	1.306***
	[0.132]	[0.139]	[0.142]	[0.152]	[0.292]
EA	0.022	0.012	0.008		
	[0.059]	[0.058]	[0.059]		
tar_i	–0.034***	–0.034***	–0.034***	0.014	0.005
	[0.010]	[0.010]	[0.010]	[0.011]	[0.025]
tar_j	0.003	0.003	0.003	0.022***	0.034*
	[0.011]	[0.011]	[0.011]	[0.008]	[0.020]
reer_i	–1.237***	–1.176***	–1.182***	–0.778***	0.049
	[0.226]	[0.226]	[0.226]	[0.211]	[0.415]
reer_j	–0.328**	–0.273*	–0.280*	–0.097	–0.432
	[0.156]	[0.160]	[0.160]	[0.164]	[0.271]
Constant	–7.452***	–6.240***	–5.838**	–0.240	–3.220
	[2.248]	[2.365]	[2.468]	[2.818]	[5.324]
Country pair-fixed effects	yes	yes	yes	yes	yes
Common year effects	yes	yes	yes	yes	yes
Number of observations	2,310	2,310	2,310	1,386	924
Number of groups	462	462	462	462	462
Within R-squared	0.66	0.66	0.66	0.57	0.48

Source: Author's calculations.

*Note: Robust standard errors (in brackets) are adjusted for clustering at the direction-specific country pair level. The sample includes every odd year between 1999 and 2007. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.*

Table 5

Varying Treatment Results

Variable				Sample until 2003	Sample until 2001
EU_8-8	0.357***	0.298***	0.311***		
	[0.087]	[0.079]	[0.079]		
EU_8-15	0.264***	0.165***	0.174***		
	[0.056]	[0.047]	[0.049]		
EU_15-8	0.038	0.000	0.005		
	[0.053]	[0.046]	[0.048]		
EU(+2)_8-8		0.167***	0.149***	0.195***	
		[0.059]	[0.054]	[0.058]	
EU(+2)_8-15		0.218***	0.171***	0.239***	
		[0.051]	[0.050]	[0.049]	
EU(+2)_15-8		0.066**	0.031	0.072**	
		[0.033]	[0.031]	[0.033]	
EU(+4)_8-8			0.048		−0.027
			[0.068]		[0.093]
EU(+4)_8-15			0.102*		0.059
			[0.053]		[0.063]
EU(+4)_15-8			0.073*		0.040
			[0.040]		[0.065]
gdp_i	1.358***	1.154***	1.121***	0.851***	0.850**
	[0.178]	[0.194]	[0.200]	[0.225]	[0.392]
gdp_j	1.253***	1.222***	1.209***	1.102***	1.464***
	[0.143]	[0.163]	[0.171]	[0.176]	[0.377]
EA	0.054	0.045	0.041		
	[0.057]	[0.056]	[0.056]		
tar_i	−0.017	−0.016	−0.015	0.012	0.007
	[0.012]	[0.012]	[0.012]	[0.011]	[0.025]
tar_j	0.001	0.001	0.002	0.023***	0.038*
	[0.011]	[0.011]	[0.011]	[0.008]	[0.020]
reer_i	−1.124***	−0.983***	−0.989***	−0.657***	0.072
	[0.213]	[0.213]	[0.214]	[0.218]	[0.425]
reer_j	−0.316**	−0.295*	−0.304*	−0.183	−0.413
	[0.153]	[0.163]	[0.163]	[0.175]	[0.274]
Constant	−4.320*	−2.340	−1.730	0.390	−6.165
	[2.443]	[2.616]	[2.813]	[2.867]	[6.088]
Country pair-fixed effects	yes	yes	yes	yes	yes
Common year effects	yes	yes	yes	yes	yes
Number of observations	2,310	2,310	2,310	1,386	924
Number of groups	462	462	462	462	462
Within R-squared	0.67	0.67	0.67	0.57	0.49

Source: Author's calculations.

*Note: Robust standard errors (in brackets) are adjusted for clustering at the direction-specific country pair level. The sample includes every odd year between 1999 and 2007. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.*