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# The impact of the 2004 EU enlargement on the performance of service enterprises in Germany's eastern border region

Nils Braakmann · Alexander Vogel

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**Abstract** We consider the impact of the 2004 EU enlargement on enterprise performance and the exporting behavior of German service enterprises in Germany's eastern border region. Our results from regression adjusted difference-in-differences estimators combined with matching and panel data from official statistics suggest that the EU enlargement had a negative impact on the turnover and export intensity of large enterprises in the border region. For small enterprises, we find an annual increase in turnover by 2.3% in 2004 and an annual decrease in profitability by 1.5 and 1.9 percentage points in 2004 and 2005, respectively.

**Keywords** EU enlargement · Enterprise performance · Exports

**JEL Classification** F15 · L80

## 1 Motivation

In May 2004, 10 countries, almost completely from the former Communist countries of Eastern Europe, joined the European Union in its hitherto largest expansion. This paper considers the impact of this enlargement on service enterprises near to Germany's eastern border to Poland and the Czech Republic. Specifically, we use panel data from German official statistics for 2003–2005 and treat the EU

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enlargement as an exogenous shock for enterprises close to Germany's eastern border. Our results from regression-adjusted difference-in-differences estimators on matched samples suggest a small negative impact on both the turnover and the export intensity of large enterprises situated in a federal state with an eastern border relative to enterprises in other federal states, while we find divergent effects with respect to the turnover and the profitability of small enterprises.

There are a number of reasons why we might expect to find an effect of the enlargement on the performance of (service) enterprises. The main theoretical reasoning here follows standard textbook models on the elimination of tariffs and barriers to trade (see e.g. Gandolfo 1998, pp. 195–204): The integration of the eastern countries into the common market lowers previously existing trade barriers and consequently the costs for both enterprises in the old and new membership countries to engage in trade with the respective other country. This (possible) increase in international trade may influence enterprise performance and behavior through an increased competition on the respective domestic market as well as through the emergence of new economic opportunities in the new foreign market.

Note that the existence of trade barriers prior to the enlargement is a necessary condition for this effect to emerge as otherwise a decrease in trade costs is logically impossible. In this study, we focus on service enterprises as strong legislative barriers existed in this sector before the expansion, for instance through residence and work permits as well as through the approval of foreign degrees in occupations with minimum qualification requirements (see Scharr and Untiedt 2001, p. 186).<sup>1</sup> The case would be different for manufacturing where free trade agreements with Poland and the Czech Republic had been established as early as 1992 (European Agreement 1993, 1994). While an increase in international trade could still emerge through less restrictive border controls and lower waiting times, the effects of the EU enlargement on trade in goods is likely to be quite small (see Scharr and Untiedt 2001, p. 185).

Additionally, note that the effects of the EU enlargement should be stronger for enterprises close to Germany's eastern border as services often require a personal contact between buyer and seller which is obviously cheaper to establish for both importers and exporters that are geographically close to the border. In our empirical investigation, we exploit this fact and compare differences over time within enterprises that are situated in a federal state with a border to the new member states with differences over time within enterprises that are situated in a federal state without such a border.

This paper is—to the best of our knowledge—the first study that considers the impact of the 2004 EU enlargement on enterprise performance. There is, however, a small empirical literature that considers the economic consequences of the opening

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<sup>1</sup> It is worthwhile to note that one cannot expect that all trade barriers between the old and new member states of the European Union have been removed by the enlargement. The European Commission has documented several barriers to trade in services even among the old member states (European Commission 2002). The discussion following the publication of this report ultimately resulted in the passing of the EU services directive (“Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market”). However, for the purpose of this paper it is sufficient that some barriers have been removed by the enlargement.

of borders. Hanson (1996) finds that the increasing economic integration of Mexico and the United States and the resulting expansion in Mexican exports has increased US manufacturing employment in several border cities. Egger and Egger (2002) find a significant relationship between trade in intermediate and final goods and industry wages in eastern and central European countries. Moritz and Gröger (2007) consider the impact of the fall of the Iron Curtain on the wages of Bavarian workers close to the Czech border using a 2% sample from German social security and unemployment benefit records and find relatively minor effects on wages and the skill distribution in the border region. However, none of these studies deal with the economic consequences of the EU enlargement.

The remainder of this paper is organized as follows: Sect. 2 describes the data, while our empirical modeling strategy is outlined in Sect. 3. Results are presented in Sect. 4. Section 5 concludes.

## 2 Data and descriptive statistics

This study uses data from the German services statistics panel which has recently been released by the Federal Statistical Office and the statistical offices of the federal states. The source surveys, the annual services statistics (*“Strukturerhebung im Dienstleistungsbereich”*), which were introduced through an initiative of the European Union (European Council 1996), have been conducted since the year 2000 by the statistical offices of the federal states and the German Federal Statistical Office. The data cover enterprises and professions (*“Freie Berufe”*) operating in the NACE divisions I (transport, storage and communication) and K (real estate, renting and business activities) with an annual turnover of €17,500 or more. Data collection is based on a stratified random sampling design where the stratification uses the federal states (*“Bundesländer”*), 4-digit industries and 12 size ranges for turnover and employees. As enterprises that were sampled in 2003 were also surveyed in 2004 and 2005, it is possible to merge the cross-sectional data sets to a panel data set that covers the years 2003–2005 (for more information see Vogel 2009).

The data include information about the economic sector, the number of employed persons (not including temporary workers), total turnover, salaries and wages, and variations in stocks. However, small enterprises with an annual turnover lower than €250,000 receive a smaller questionnaire, so important information, in particular concerning export activities, is missing for these enterprises. Given this restriction, all analyses are conducted separately for small and large enterprises with exports being only analyzed for the latter.

Export activities of enterprises are measured by an export dummy (1 if exporting; 0 if not) and export intensity (percentage of exports in total turnover). Unfortunately, the data set contains no information about the target countries for exports or other international activities such as partnerships, direct investments or imports. The number of employees is based on the number of employed persons and not on full-time equivalents as this information is not available in the data set. This difference has to be considered while interpreting the labor productivity measurement value added per head (computed in line with the definition by the European Commission 1998) and the

subsidies per head. The average wage of an enterprise is computed by the total amount of wages and salaries, divided by the number of wage and salary earners. The turnover profitability is generated as gross enterprise surplus, which is the surplus generated by operating activities after the labor factor input has been recompensed (see European Commission 1998), divided by total turnover, minus the change in stocks of goods.

In this study we focus on enterprises in business activities (NACE division K), in particular the 2-digit industries 72 “Computer and related activities”, 73 “Research and Development” and 74 “Other business activities”, which covers consulting and related activities, as these require a high level of personal or direct intervention between buyers and sellers and should consequently profit or suffer more from the EU enlargement than enterprises in the NACE division I (transport, storage and communication), which we ignore. Furthermore, enterprises that are active in storage or transports may have already profited from the earlier trade agreements in a similar way as manufacturing enterprises which implies that one cannot expect a large effect of the enlargement on these enterprises. Finally, we drop enterprises without any wage and salary earner, enterprises in the 1st or 99th percentile of the sales or profitability distribution and enterprises without a pre-treatment observation.

This procedure yields an unbalanced panel of 58,273 enterprise-year observations for 22,872 large enterprises and 28,292 enterprise-year-observations for 12,643 small enterprises. In a second step we create a balanced sample by restricting the sample to those enterprises that are observed in all 3 years. The resulting sample consists of 48,015 enterprise-year observations for 16,005 large enterprises and 19,233 enterprise-year observations for 6,411 small enterprises. Finally, we create a matched sample of enterprises from the balanced panel by matching (without replacement) each observation located in a federal state with an eastern border (henceforth *treatment group*) to a firm that is situated in any of the remaining federal states (henceforth *control group*) using nearest neighbor propensity score matching. The propensity score is calculated by a probit regression of the eastern border dummy on the number of employees and its squared value, value added per head, average wage per head, total turnover, subsidies per head and a set of 4-digit industry dummy variables (all measured in 2003).<sup>2</sup> This sample which maximizes similarities between treatment and control group in the year prior to the EU enlargement consists of 25,044 enterprise-year observations for 8,348 large enterprises and 11,454 enterprise-year observations for 3,818 small enterprises.<sup>3</sup> Descriptive statistics for all samples can be found in Table 1.

### 3 Empirical modeling

Our analysis treats the EU enlargement in 2004 as a natural experiment that affects enterprises near Germany’s eastern border where the decrease in trade costs should

<sup>2</sup> The results of the probit model are reported in the appendix (see Table 4).

<sup>3</sup> The balancing property, which requires an absence of statistically significant (and economically large) differences between the treatment group and the control group in the covariates after matching, is satisfied (see Table 5 in the appendix).

**Table 1** Descriptive statistics—Germany

Variable	Unbalanced panel		Balanced panel		Matched sample	
	Mean	SD	Mean	SD	Mean	SD
<b>“Large” enterprises with a turnover greater or equal than €250,000</b>						
Total turnover (in €1,000)	3,215.66	6,528.90	3,450.57	6,779.73	3,039.42	5,921.80
Turnover profitability	0.1832	0.2317	0.1795	0.2261	0.1716	0.2215
Average wage (in €1,000)	31.85	27.95	31.97	27.38	30.64	26.53
Number of employees	60.30	190.80	65.72	202.40	59.15	172.77
Value added per employee (in €1,000)	55.51	51.44	54.75	49.24	50.96	43.71
Subsidies per employee (in €1,000)	0.24	2.86	0.24	2.96	0.34	3.73
Export intensity	0.0294	0.1199	0.0294	0.1181	0.0292	0.1176
Export participation (dummy)	0.1762	0.3810	0.1854	0.3886	0.1819	0.3858
Enterprise located in a federal state with a border to Poland or the Czech Republic (dummy)	0.2741	0.4461	0.2608	0.4391	0.5000	0.5000
Number of observations	58,273		48,015		25,044	
Number of enterprises	22,872		16,005		8,348	
<b>“Small” enterprises with a turnover lower than €250,000</b>						
Total turnover (in €1,000)	123.77	60.18	121.10	55.48	122.74	55.57
Turnover profitability	0.3209	0.3309	0.3420	0.3037	0.3355	0.2977
Average wage (in €1,000)	16.39	15.61	15.83	14.37	15.60	13.37
Number of employees	3.54	4.44	3.44	3.02	3.51	3.16
Value added per employee (in €1,000)	30.23	21.28	30.00	20.13	29.36	19.52
Subsidies per employee (in €1,000)	0.18	1.58	0.16	1.48	0.21	1.61
Enterprise located in a federal state with a border to Poland or the Czech Republic (dummy)	0.3062	0.4609	0.2978	0.4573	0.5000	0.5000
Number of observations	28,292		19,233		11,454	
Number of enterprises	12,643		6,411		3,818	

*Note:* The unbalanced panel consists of all enterprises that are observed in all 3 years (2003, 2004 and 2005) or that are observed in the first 2 years (2003 and 2004). The latter are dropped for the balanced sample. Finally, the matched sample is created from the balanced panel by matching (without replacement) each observation from the treatment group to its nearest neighbor from the control group using propensity score matching. The propensity score is calculated by a probit regression of the eastern border dummy on the number of employees and its squared value, value added per head, average wage per head, total turnover, subsidies per head, and a set of 4-digit industry dummy variables (all measured in 2003). Enterprises with no wage and salary earner and enterprises in the 1st or 99th percentile of the sales or profitability distribution are excluded from all computations

be particularly strong. Specifically, we treat enterprises located in one of the federal states with an eastern border—Bavaria, Brandenburg, Mecklenburg-Western Pomerania and Saxony—as the treatment group and use enterprises situated in any of the remaining federal states as the control group. Note that we treat Berlin as part of the treatment group as it is fully contained in Brandenburg and consequently closer to the border than Brandenburg’s western regions. To avoid issues with enterprises selecting into or out of the treatment group all definitions are based on the location

in the pre-treatment year 2003. We then model impact of the EU enlargement on turnover, profitability and, for large enterprises, exports using (regression-adjusted) difference-in-differences. More formally, we consider the following estimating equation

$$y_{it} = \eta_i + \beta'X_{it} + \delta T_{it} + \tau(D_i T_{it}) + \varepsilon_{it}, \quad (1)$$

where  $y_{it}$  is the outcome of interest,  $X_{it}$  contains control variables described below,  $\varepsilon_{it}$  is a standard error term,  $\eta_i$  is a enterprise-specific fixed effect and  $T_{it}$  contains two time dummies for 2004 and 2005.  $\tau$  measures the divergence in average outcomes between the treatment and the control group in these 2 years which equals our effect of interest. As control variables we include a second order polynomial in the number of employees, value added per head as measure of productivity, the average wage per head as a proxy for human capital, and subsidies per head. The latter are included as some recent evidence, while being in parts contradictory to each other, suggests that production related subsidies may influence international firm activities, e.g. the exporting behavior of a firm (see Girma et al. 2007, for China; Görg et al. 2008, for Ireland and Girma et al. 2009, for Germany).

Note that  $\tau$  can be interpreted as a causal effect if (a) enterprises cannot select into or out of the treatment group, (b) enterprises cannot select into or out of the treatment period and (c) both treatment and control group would have experienced the same trends in the absence of treatment. The first two concerns are more relevant for cross-sectional difference-in-differences and are alleviated through the panel design of this study, which enables us to base group definitions on pre-treatment locations and to use both pre- and post-treatment observations for each enterprise. Unfortunately, we cannot use pre-treatment trend comparisons or pseudo-interventions to “test” the common-trend assumption as data coverage begins only 1 year prior to the real intervention. Note, however, that using a matched sample ensures that we compare only plants that were identical with respect to the number of employees, value added per head, average wage per head, subsidies per head and total turnover in the year prior to the EU-enlargement. Additionally, the distributions of 4-digit industries are identical in the treatment and the control group. Finally, note that controlling for enterprise-specific fixed effects and the control variables further alleviates concerns regarding the validity of the common-trend assumption.

Additionally, we conduct a simple robustness check to allow for differences between enterprises in East and West Germany. Allowing for these differences seems sensible as subsidies, wages and productivity differ between East and West German plants.<sup>4</sup> In this version of Eq. (1), we additionally interact an East Germany dummy ( $East_i$ ) and all control ( $X_{it}$ ), time ( $T_{it}$ ) and treatment effect ( $D_i T_{it}$ ) variables and estimate the equation

<sup>4</sup> See Wagner (2010) and Girma et al. (2009) for evidence on subsidies and Barrel and te Velde (2000), Czarnitzki (2005), Franz and Steiner (2000) and Klodt (2000) for evidence on wages and/or productivity.

$$y_{it} = \eta_i + \beta'X_{it} + \delta T_{it} + \tau(D_i T_{it}) + \gamma'X_{it} \text{East}_i + \omega(T_{it} \text{East}_i) + \rho(D_i T_{it} \text{East}_i) + \varepsilon_{it}. \quad (2)$$

In this specification  $\rho$  measures differences in the effect of the EU enlargement between enterprises in East and West Germany, specifically Bavaria.

#### 4 Results

Consider the results for the difference-in-differences estimates based on the matched sample displayed in Table 2. Results using unmatched samples for both the balanced and the unbalanced panel can be found in the appendix (see Tables 6, 7). Note that the pattern of results regarding, e.g. the signs of the coefficients is generally identical, while some differences are found for the size and the significance of the effects.

Before turning to the parameters of interest, note that the apparently large differences in the effects of enterprise size on log turnover and turnover profitability between small and large enterprises are directly related to the differences in enterprise size. Using simulations of the effects over realistic enterprise size ranges in both groups reveals that the effects are economically sensible. In particular, while the estimates for the effect of enterprise size on the (log) turnover of small enterprises look unrealistically large at a first glance, the simulations suggest realistic changes in the outcome over the range of 1–50 employees. As almost all enterprises in the data set are smaller than the maximum of the respective quadratic equation, the results should be interpreted as a positive relationship (with slightly degressive character) between size and turnover or turnover profitability, respectively for both small and large enterprises. The coefficients of the remaining control variables are as expected.

Turn now to the parameters of interest. For large enterprises, we observe a lower profitability, a higher turnover, and both a higher export intensity and a higher share of exporters in 2004 and 2005 relative to 2003. The pattern is somewhat different for small enterprises where—compared to 2003—turnover is lower in 2004 and 2005, while profitability remains unchanged over these years.

Similarly, differences between large and small enterprises are also found for the interaction terms that describe the effect of the EU enlargement on enterprises close to Germany's eastern border. For large enterprises, we find decline in both turnover in 2005 and the export intensity in 2004, while the turnover profitability and the share of exporters remain unchanged by the economic integration of the eastern countries. Both effects are not particularly large but also non-negligible in economic terms as turnover declines by circa 1.4% while the export intensity is reduced by roughly 0.5 percentage points (compared to a mean export intensity of 2.9%).

The case is somewhat different for small enterprises. Here, we obtain a positive and significant effect that suggests an increase in turnover by 2.3% for the treatment group in 2004. At the same time profitability in this group drops by 1.5 percentage points in 2004 and by another 1.9 percentage points in 2005 which is not negligible compared to a mean profitability of circa 34%. Unfortunately, we can only speculate

**Table 2** Difference-in-differences estimates, based on within-estimator (matched sample/balanced panel)—Germany

	Large enterprises (turnover <i>greater or equal than</i> €250,000 per year)				Small enterprises (turnover <i>lower than</i> €250,000 per year)	
	Log of turnover	Turnover profitability	Export intensity	Export status	Log of turnover	Turnover profitability
Year = 2004	0.0163*** (0.0040)	-0.0076*** (0.0025)	0.0040** (0.0018)	0.0125** (0.0053)	-0.0244*** (0.0062)	-0.0028 (0.0048)
Treatment = 1 and year = 2004	-0.0075 (0.0056)	-0.0015 (0.0036)	-0.0041* (0.0024)	-0.0029 (0.0074)	0.0230*** (0.0085)	-0.0150** (0.0068)
Year = 2005	0.0169*** (0.0054)	-0.0117*** (0.0027)	0.0032* (0.0017)	0.0216*** (0.0057)	-0.0390*** (0.0072)	0.0025 (0.0052)
Treatment = 1 and year = 2005	-0.0138* (0.0074)	-0.0006 (0.0038)	0.0025 (0.0025)	0.0014 (0.0079)	0.0142 (0.0099)	-0.0194*** (0.0073)
Size	0.0030*** (0.0004)	0.0002*** (0.0001)	-0.0000 (0.0000)	0.0001* (0.0001)	0.0972*** (0.0083)	0.0230*** (0.0032)
Size squared [in 1,000]	-0.0006*** (0.0002)	0.0000*** (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	-1.0031*** (0.1314)	-0.2585*** (0.0544)
Value added per worker [in €1,000]	0.0023*** (0.0001)	0.0036*** (0.0001)	0.0000 (0.0000)	0.0000 (0.0001)	0.0092*** (0.0004)	0.0111*** (0.0003)
Average wage [in €1,000]	0.0001 (0.0001)	-0.0014*** (0.0004)	0.0000 (0.0000)	0.0000 (0.0001)	0.0025*** (0.0005)	-0.0111*** (0.0006)
Subsidies per head [in €1,000]	-0.0032* (0.0018)	0.0013* (0.0008)	0.0004 (0.0003)	0.0010 (0.0012)	-0.0062** (0.0027)	0.0064** (0.0029)
Number of observations	25,044	25,044	25,044	25,044	11,454	11,454
Number of enterprises	8,348	8,348	8,348	8,348	3,818	3,818

*Note:* Presented are the estimated coefficients, standard errors adjusted for clustering on the enterprise level in parentheses and the level of significance (\*\*\*) significant at the 1% level, \*\* significant at the 5% level, \* significant at the 10% level). Results are based on a matched sample of enterprises created from the balanced panel by matching (without replacement) each observation from the treatment group to its nearest neighbor from the control group using propensity score matching. The propensity score is calculated by a probit regression of the eastern border dummy on the number of employees and its squared value, value added per head, average wage per head, total turnover, subsidies per head, and a set of 4-digit industry dummy variables (all measured in 2003). Enterprises with no wage and salary earner and enterprises in the 1st or 99th percentile of the sales or profitability distribution are excluded from all computations

whether these results are caused by an eastward expansion that increases turnover but at the same time reduces profitability through start-up costs as we do not have information on the exporting behavior of these enterprises.

Table 3 presents the results for the model where all variables were interacted with an East Germany dummy. Results for the control variables and the corresponding interaction terms are omitted to save space.

For both large and small firms, we do not find significant differences between the causal effect of the EU enlargement in Bavaria and East Germany. For large firms,

**Table 3** Difference-in-differences estimates, based on within-estimator (matched sample/balanced panel)—estimation with East Germany interaction terms

	Large enterprises (turnover <i>greater or equal than</i> €250,000 per year)				Small enterprises (turnover <i>lower than</i> €250,000 per year)	
	Log of turnover	Turnover profitability	Export intensity	Export status	Log of turnover	Turnover profitability
Year = 2004	0.0158*** (0.0042)	-0.0079*** (0.0026)	0.0037** (0.0019)	0.0126** (0.0057)	-0.0267*** (0.0070)	-0.0042 (0.0053)
Treatment = 1 and year = 2004	-0.0116 (0.0074)	0.0013 (0.0047)	-0.0037 (0.0035)	0.0010 (0.0105)	0.0071 (0.0140)	-0.0142 (0.0124)
Year = 2005	0.0173*** (0.0057)	-0.0109*** (0.0028)	0.0036** (0.0018)	0.0220*** (0.0061)	-0.0384*** (0.0081)	0.0014 (0.0058)
Treatment = 1 and year = 2005	-0.0172* (0.0094)	0.0016 (0.0049)	0.0043 (0.0037)	0.0187* (0.0111)	-0.0083 (0.0152)	-0.0150 (0.0132)
Year = 2004 (× East Germany dummy)	0.0037 (0.0142)	-0.0006 (0.0094)	0.0040 (0.0062)	-0.0013 (0.0139)	0.0159 (0.0147)	0.0078 (0.0117)
Treatment = 1 and year = 2004 (× East Germany dummy)	0.0044 (0.0163)	-0.0048 (0.0108)	-0.0040 (0.0071)	-0.0061 (0.0175)	0.0088 (0.0202)	-0.0065 (0.0170)
Year = 2005 (× East Germany dummy)	-0.0057 (0.0178)	-0.0116 (0.0100)	-0.0059 (0.0064)	-0.0052 (0.0162)	-0.0028 (0.0177)	0.0062 (0.0128)
Treatment = 1 and year = 2005 (× East Germany dummy)	0.0111 (0.0205)	0.0057 (0.0113)	0.0019 (0.0075)	-0.0264 (0.0198)	0.0336 (0.0233)	-0.0084 (0.0182)
Number of observations	25,044	25,044	25,044	25,044	11,454	11,454
Number of enterprises	8,348	8,348	8,348	8,348	3,818	3,818

*Note:* Presented are the estimated coefficients, standard errors adjusted for clustering on the enterprise level in parentheses and the level of significance (\*\*\*) significant at the 1% level, \*\* significant at the 5% level, \* significant at the 10% level). Not presented are the coefficients of the control variables (number of employees and its squared value, value added per head, average wage per head, total turnover and subsidies per head) and their interactions with the East Germany dummy. Results are based on a matched sample of enterprises created from the balanced panel by matching (without replacement) each observation from the treatment group to its nearest neighbor from the control group using propensity score matching. The propensity score is calculated by a probit regression of the eastern border dummy on the number of employees and its squared value, value added per head, average wage per head, total turnover, subsidies per head, and a set of 4-digit industry dummy variables (all measured in 2003). Enterprises with no wage and salary earner and enterprises in the 1st or 99th percentile of the sales or profitability distribution are excluded from all computations

the size of the coefficients of the East Germany interactions suggests only small differences between East and West German enterprises. The only exception is an increase in the likelihood of an enterprise being an exporter found in West

Germany. For East Germany, the point estimate for the interaction term suggests that this increase was close to zero, although the difference is not statistically significant on conventional levels. For small firms, the positive effects found for (log) turnover in the baseline estimates seem to be driven by the East German firms. Here, point estimates for West German firms are generally close to zero and insignificant while point estimates for East Germany are often large and positive—although the precision of the estimates does not allow the rejection of the Null hypothesis of no effect.

Taken together, these results imply that the EU enlargement in 2004 had a non-negligible, though not particularly large negative impact on large enterprises close to the border relative to firms farther away from the border with respect to both turnover and export intensity. For small enterprises we observe an increase in turnover in 2004 and a drop in profitability in both years after the enlargement. This result is consistent with the idea that these enterprises have expanded into the eastern market which increases turnover but reduces (current) profitability through start-up costs. Looking at differences between East and West German enterprises suggests that these effects are driven by East German enterprises.

What factors can explain the somewhat counterintuitive results for small firms? Remember that our sample consists of *business* service enterprises, e.g. consulting firms, which require relatively high-qualified labor. It seems possible that these firms were able to profit from the EU enlargement by focusing on, e.g. consulting activities in the new member countries, for instance, related to market research or legal restrictions in the common market. Large business service firms might not have been interested in specializing in this type of activities or might have already been active in the new member countries in the years prior to the expansion, e.g. through subsidiaries. Note, however, that this speculation cannot be tested as the data do not contain information on the exporting behavior of small firms.

## 5 Conclusion

This paper considered the impact of the 2004 EU enlargement on service enterprises close to Germany's eastern border. Relying on panel data for 2003–2005 from German official statistics, we use regression-adjusted difference-in-differences estimators. Our results suggest a (small) negative impact of the EU enlargement on the turnover and export intensity of large enterprises with an annual turnover of €250,000 and more. We also find no effect on the share of exporters and the turnover profitability of these enterprises. For small enterprises close to Germany's eastern border, however, we find an increase in average turnover by 2.3% in 2004 and a decrease in profitability by 1.5 percentage points in 2004 and by an additional 1.9 percentage points in 2005 relative to other small enterprises. The latter finding is consistent with the idea that small enterprises expand to the east thereby increasing turnover but facing a reduction in profitability due to start-up costs. Unfortunately, this idea cannot be tested with the available data.

Taken together, we obtain mixed results for the effect of the EU enlargement on German service enterprises with small firms gaining in some aspect and larger firms

loosing. The results also provide some support for the idea that in particular small enterprises were able to expand into the new eastern markets. On a political level, the results suggest that the somewhat skeptical perspectives of many Germans regarding globalization and its consequences<sup>5</sup> may not be warranted with respect to the EU-enlargement. The results also contradict the view that globalization is only beneficial for large enterprises. Finally, the results highlight the fact that globalization may create winners and losers which is often forgotten in political and public debates focusing on the negative sides of globalization and trade liberation.

## Appendix

See Tables 4, 5, 6 and 7.

**Table 4** Results of the probit model for the propensity score matching—Germany, all variables from the pre-treatment-year 2003

	Probit regression of the eastern border dummy	
	Large enterprises (turnover greater or equal than €250,000 per year)	Small enterprises (turnover lower than €250,000 per year)
Size	−0.0003** (0.0001)	−0.0132 (0.0115)
Size squared [in 1,000]	0.0000 (0.0000)	0.1590 (0.1893)
Value added per worker [in €1,000]	−0.0012*** (0.0003)	−0.0030** (0.0012)
Average wage [in €1,000]	−0.0010* (0.0006)	0.0002 (0.0014)
Total turnover [in €1,000]	0.0000 (0.0000)	0.0009** (0.0004)
Subsidies per employee [in €1,000]	0.0129*** (0.0036)	0.0523*** (0.0103)
4-Digit industry dummies	Yes	Yes
Number of observations	16,005	6,411

*Note:* Presented are the estimated coefficients, standard errors in parentheses and the level of significance (\*\*\*) significant at the 1% level, \*\* significant at the 5% level, \* significant at the 10% level). The probit regression of the eastern border dummy was used to calculate the propensity score for the matching procedure. Enterprises with no wage and salary earner and enterprises in the 1st or 99th percentile of the sales or profitability distribution are excluded from all computations

<sup>5</sup> See for instance the 2004–2006 surveys “Perspectives on Trade and Poverty Reduction,” by the German Marshall Fund where about 50% of German respondents in each year had a unfavorable view of globalization and about one-third reported an unfavorable view of the common market. For an econometric analysis on the relationship between international outsourcing and job loss fears see Frijters and Geishecker (2008).

**Table 5** Balancing property—Germany

Variable	Sample	Mean		<i>p</i> -Value
		Treatment group	Control group	
“Large” enterprises with a turnover greater or equal than €250,000				
Number of employees	Unmatched	57.69	67.02	0.009
	Matched	57.69	59.11	0.709
Number of employees squared (in 1,000)	Unmatched	30.98	47.61	0.087
	Matched	30.98	36.14	0.584
Average wage (in €1,000)	Unmatched	30.70	32.70	0.000
	Matched	30.70	30.80	0.844
Value added per employee (in €1,000)	Unmatched	52.89	58.84	0.000
	Matched	52.89	52.25	0.502
Subsidies per employee (in €1,000)	Unmatched	0.47	0.24	0.000
	Matched	0.47	0.36	0.151
Total turnover (in €1,000,000)	Unmatched	3.0	3.5	0.000
	Matched	3.0	3.0	0.944
“Small” enterprises with a turnover lower than €250,000				
Number of employees	Unmatched	3.55	3.45	0.255
	Matched	3.55	3.59	0.673
Number of employees squared (in 1,000)	Unmatched	0.22	0.21	0.800
	Matched	0.22	0.25	0.597
Average wage (in €1,000)	Unmatched	15.92	16.25	0.410
	Matched	15.92	15.98	0.899
Value added per employee (in €1,000)	Unmatched	30.14	31.20	0.056
	Matched	30.14	30.18	0.954
Subsidies per employee (in €1,000)	Unmatched	0.39	0.18	0.000
	Matched	0.39	0.28	0.060
Total turnover (in €1,000,000)	Unmatched	0.13	0.12	0.228
	Matched	0.13	0.13	0.668

*Note:* Presented are the *p*-values of mean comparisons tests of the used covariates between the treatment group and the control group before and after matching. The matched sample is created from the balanced panel by matching (without replacement) each observation from the treatment group to its nearest neighbor from the control group using propensity score matching. The propensity score is calculated by a probit regression of the eastern border dummy on the number of employees and its squared value, value added per head, average wage per head, total turnover, subsidies per head, and a set of 4-digit industry dummy variables (all measured in 2003). Enterprises with no wage and salary earner and enterprises in the 1st or 99th percentile of the sales or profitability distribution are excluded from all computations

**Table 6** Difference-in-differences estimates, based on within-estimator (unbalanced panel)—Germany

	Large enterprises (turnover <i>greater</i> or <i>equal than</i> €250,000 per year)				Small enterprises (turnover <i>lower than</i> €250,000 per year)	
	Log of turnover	Turnover profitability	Export intensity	Export status	Log of turnover	Turnover profitability
Year = 2004	0.0027 (0.0024)	-0.0076*** (0.0014)	0.0032*** (0.0010)	0.0109*** (0.0029)	-0.0156*** (0.0039)	-0.0072** (0.0030)
Treatment = 1 and year = 2004	-0.0005 (0.0046)	-0.0039 (0.0028)	-0.0036** (0.0018)	-0.0019 (0.0056)	0.0171** (0.0067)	-0.0135** (0.0054)
Year = 2005	0.0103*** (0.0031)	-0.0111*** (0.0016)	0.0038*** (0.0010)	0.0199*** (0.0033)	-0.0375*** (0.0045)	-0.0005 (0.0033)
Treatment = 1 and year = 2005	-0.0076 (0.0059)	-0.0037 (0.0030)	0.0012 (0.0020)	0.0023 (0.0062)	0.0084 (0.0079)	-0.0153*** (0.0058)
Size	0.0019*** (0.0002)	0.0001*** (0.0000)	-0.0000 (0.0000)	0.0000 (0.0001)	0.1046*** (0.0062)	0.0239*** (0.0026)
Size squared [in 1,000]	-0.0003*** (0.0001)	0.0000*** (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	-1.1875*** (0.1600)	-0.3041*** (0.0598)
Value added per worker [in €1,000]	0.0020*** (0.0001)	0.0031*** (0.0001)	-0.0000 (0.0000)	-0.0001** (0.0000)	0.0096*** (0.0002)	0.0110*** (0.0002)
Average wage [in €1,000]	0.0001 (0.0001)	-0.0017*** (0.0003)	0.0000 (0.0000)	0.0000 (0.0001)	0.0026*** (0.0004)	-0.0112*** (0.0004)
Subsidies per head [in €1,000]	-0.0034** (0.0016)	0.0020** (0.0008)	0.0003 (0.0003)	0.0006 (0.0010)	-0.0070*** (0.0024)	0.0062*** (0.0022)
Number of observations	58,273	58,273	58,273	58,273	28,292	28,292
Number of enterprises	22,872	22,872	22,872	22,872	12,643	12,643

*Note:* Presented are the estimated coefficients, standard errors adjusted for clustering on the enterprise level in parentheses and the level of significance (\*\*\*) significant at the 1% level, \*\* significant at the 5% level, \* significant at the 10% level). Results are based on enterprises that are observed in all 3 years (2003, 2004 and 2005) or that are observed in the first 2 years (2003 and 2004). Enterprises with no wage and salary earner and enterprises in the 1st or 99th percentile of the sales or profitability distribution are excluded from all computations

**Table 7** Difference-in-differences estimates, based on within-estimator (balanced panel)—Germany

	Large enterprises (turnover <i>greater</i> or <i>equal than</i> €250,000 per year)				Small enterprises (turnover <i>lower than</i> €250,000 per year)	
	Log of turnover	Turnover profitability	Export intensity	Export status	Log of turnover	Turnover profitability
Year = 2004	0.0109*** (0.0024)	-0.0070*** (0.0015)	0.0033*** (0.0010)	0.0122*** (0.0032)	-0.0148*** (0.0041)	-0.0063* (0.0033)
Treatment = 1 and year = 2004	-0.0023 (0.0047)	-0.0032 (0.0030)	-0.0034* (0.0019)	-0.0029 (0.0060)	0.0144** (0.0071)	-0.0116** (0.0058)
Year = 2005	0.0135*** (0.0032)	-0.0102*** (0.0016)	0.0040*** (0.0010)	0.0206*** (0.0034)	-0.0331*** (0.0048)	0.0003 (0.0034)
Treatment = 1 and year = 2005	-0.0098 (0.0061)	-0.0038 (0.0031)	0.0014 (0.0021)	0.0020 (0.0065)	0.0101 (0.0084)	-0.0173*** (0.0061)
Size	0.0020*** (0.0002)	0.0001*** (0.0000)	-0.0000 (0.0000)	0.0001 (0.0001)	0.1052*** (0.0073)	0.0244*** (0.0030)
Size squared [in 1,000]	-0.0003*** (0.0001)	0.0000*** (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	-1.1832*** (0.1956)	-0.3123*** (0.0783)
Value added per worker [in €1,000]	0.0020*** (0.0001)	0.0031*** (0.0001)	-0.0000 (0.0000)	-0.0001** (0.0001)	0.0096*** (0.0003)	0.0111*** (0.0002)
Average wage [in €1,000]	0.0001 (0.0001)	-0.0016*** (0.0003)	0.0000 (0.0000)	0.0000 (0.0001)	0.0023*** (0.0004)	-0.0111*** (0.0004)
Subsidies per head [in €1,000]	-0.0033** (0.0016)	0.0021** (0.0009)	0.0004 (0.0003)	0.0008 (0.0011)	-0.0056** (0.0025)	0.0059*** (0.0023)
Number of observations	48,015	48,015	48,015	48,015	19,233	19,233
Number of enterprises	16,005	16,005	16,005	16,005	6,411	6,411

*Note:* Presented are the estimated coefficients, standard errors adjusted for clustering on the enterprise level in parentheses and the level of significance (\*\*\*) significant at the 1% level, \*\* significant at the 5% level, \* significant at the 10% level). Results are based on enterprises that are observed in all 3 years (2003, 2004 and 2005). Enterprises with no wage and salary earner and enterprises in the 1st or 99th percentile of the sales or profitability distribution are excluded from all computations

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