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Export, Migration, and Costs of Market Entry: Evidence from Central European Firms[*]

Dieter Pennerstorfer[†]

Abstract

In this article I analyze the export behavior of firms located in different Central European countries (Austria, Hungary, Czech Republic and Slovakia) with respect to migration. Ever since the seminal article by Gould (1994) on immigrant links to their home country and due to empirical research following his contribution, it is a well established result that immigrants from a particular country spur exports to and imports from that destination. Chaney (2008) shows that a decrease in fixed costs of exporting increases the number of exporters (extensive margin), whereas a reduction in variable costs also increases the volume exported by each exporting firm (intensive margin). Empirical contributions using firm-level data focus on various aspects influencing costs of exporting (like spillover effects of nearby firms (Sinani and Hobdari, 2010; Silvente and Geménez, 2007) or financial factors (Berman and Héricourt, 2010)), but leave out the issue of migration. I combine detailed information coming from a questionnaire conducted among 8,300 firms on the export behavior to different countries with regional data on migration from the European Labor Force Survey (LFS). I find evidence that both the propensity to export and – to a much smaller extent – the volume of sales of exporting firms to a particular destination is higher for firms located in regions with a larger number of immigrants from that country. I conclude that migrants mainly reduce fixed costs of exporting.

Keywords: Firm-level data; Export destinations; Immigrants; Margins of trade

JEL classification: D21; F22; F1; R12

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1. Introduction and Related Literature

It has been quite a while since Ravenstein (1885) has formulated seven "laws of migration" to explain patterns of migration flows on the eve of the 19th century. While various causes and consequences of migration have been analyzed ever since, it, however, took more than a century that the issue of migration has been linked to foreign trade. Gould (1994) was the first who analyzed this relationship and introduced costs associated with gaining information on foreign markets in a gravity equation explaining trade flows. In his model, it is costly to get information on foreign markets. These information costs have to be paid in addition to the well-known costs of trade, namely tariffs and transportation costs. Gould (1994) links the costs of getting information of a particular country with the number of immigrants from that country and argues that immigrants can reduce trade costs to their home countries due to their language skills, their information about home country preferences and their ties to the home country that facilitates the development of trust. In an empirical application of his model Gould (1994) analyzes trade flows between the U.S. and 47 trading partners and shows that the number of immigrants from a particular country has a positive impact on the volume of trade. He finds that exports are more heavily influenced than imports and consumer goods are more strongly affected than producer goods.

Gould's (1994) article was followed by a large number of empirical articles investigating the links between trade patterns and immigration. Peri and Requena-Silvente (2010) offer a detailed literature review and show that – despite using different data and methods – all of the most important empirical articles investigating this relationship find a positive impact of immigration on exports, although the export elasticities with respect to immigration[1] differ considerably and range from 0.07 to 0.47. Peri and Requena-Silvente (2010) themselves analyze trade flows between Spanish regions to 77 destination countries between 1995 and 2008. They find an export elasticity of immigrants of 0.110 (in their preferred specification) and attribute the largest part (0.082) to a change in the number of transactions and only a small share (0.028) to a change in the average volume per transaction. All articles dealing with immigration and trade use country- and regional-level data. At the firm level – to my knowledge – no empirical contribution examining the influence of migrants on firms' export decisions exists. This is not surprising, as one cannot deduct hypotheses from Gould's (1994) model to explain firm behavior directly: In his gravity model, the production function deals with industries only, but not with firms.

Recent theoretical contributions by Melitz (2003) and Chaney (2008) encourage analyzing firm behavior, as they extend the Krugman (1980) gravity model on trade by introducing firm

[1] The export elasticity of immigration is defined as the relative change of export volumes over the relative change of the number of immigrants.

heterogeneity with respect to productivity and distinguish between fixed and variable costs of exporting. Both articles follow Krugman (1980) in assuming monopolistic competition and increasing returns to scale. Their approach to derive trade flows between two countries is different from Gould (1994), as they start with individual firms that are characterized by different productivity levels and derive a threshold productivity level for exporting to a particular country. All firms below this threshold productivity refrain from exporting to this country. Aggregate trade flows are derived by adding up the export volumes of all exporting firms. Chaney's (2008) model is more general than the model endorsed by Melitz (2003), as he allows for asymmetric trading partners. Chaney (2008) analyzes the export decisions of firms depending on the size, remoteness and trade barriers (variable and fixed costs of exporting) of the destination country. He shows that fixed costs influence the decision of firms to start exporting, but it does not affect the export volumes of exporting firms. Variable export costs influence both, the export propensity and the export volumes. An increase in the export volume due to a reduction in export costs can stem from an increase in export volumes of firms that already exported before the reduction in trade costs (the "intensive margin") and/or from new exporters (the "extensive margin"). The corresponding elasticities coming from a reduction in variable trade costs τ_{ij} or fixed trade costs f_{ij} between the exporting country *i* and the importing country *j* can be split in an intensive and an extensive margin elasticity and stated as:

$$-\frac{d\ln X_{ij}}{d\ln \tau_{ij}} = \gamma = \underbrace{(\sigma-1)}_{\substack{\text{Intensive}\\ \text{margin}\\ \text{Elasticity}}} + \underbrace{\big(\gamma-(\sigma-1)\big)}_{\substack{\text{Extensive}\\ \text{margin}\\ \text{Elasticity}}} \tag{1}$$

$$-\frac{d\ln X_{ij}}{d\ln f_{ij}} = \frac{\gamma}{(\sigma-1)} - 1 = \underbrace{0}_{\substack{\text{Intensive}\\ \text{margin}\\ \text{Elasticity}}} + \underbrace{\frac{\gamma}{(\sigma-1)} - 1}_{\substack{\text{Extensive}\\ \text{margin}\\ \text{Elasticity}}} \tag{2}$$

X_{ij} denotes the trade volumes from country *i* to *j*. σ indicates the elasticity of substitution between two varieties of goods of the same sectors and γ describes the heterogeneity of firms with respect to productivity.[2]

This line of literature spurred research using firm-level data on the export propensity (extensive margin) and the export volume of exporting firms (intensive margin), using different variables indicating export costs. Koenig et al. (2010) investigate the impact of spillover effects on the export decisions of French firms. They analyze a panel data set of more than 8,000 firms for different

[2] Chaney (2008) assumes that the productivity of firms is distributed Pareto over the interval $[1,+\infty)$ with the shape parameter γ. He estimates the ratio $\frac{\gamma}{(\sigma-1)} \approx 2$ using data on US firms. Eaton et al. (2008) find a smaller value (around 1.5) for this ratio using the export propensity of French firms.

destination countries at the product level and argue that spillover effects reduce trade costs. They find evidence for positive spillover effects from other firms in the same area if they export the same product or if they export to the same destination country on the probability to start exporting. The spillover effects are strongest from firms that export the same product to the same destination. The authors do not find evidence of spillover effects on the export volumes.[3] They "interpret this as a first evidence of export spillovers acting through the fixed rather than the variable cost" (p. 622). Berman and Héricourt (2010) analyze around 5,000 firms in 9 developing countries and investigate the impact of financial constraints on entering the export market, but do not distinguish between different destination countries. They find that financial constraints reduce the propensity of becoming an exporter, but do not impact the probability of a firm remaining an exporter, nor influence the export volume. The export volume is measured by the value of exports (sales) and by the share of exports over total sales. The authors interpret these results as evidence of the existence of large sunk costs when entering the export market. The fixed costs of exporting that have to be paid each period might be dramatically lower than the fixed costs for starting to export.

In this article I investigate the export decision of firms with respect to the regional stock of immigrants. I evaluate whether an increase in export activities of firms due to a large number of migrants stems from a reduction in fixed or variable costs of exporting. I contribute to the existing literature, as – to my knowledge – I am the first who explains the export decision of firms by the (regional) stock of migrants. All empirical articles investigating the export behavior using firm-level data leave out the issue of migration. The articles analyzing the link between trade and migration use regional data. One is, however, unable to assess whether migrants affect fixed and/or variable costs of exporting when analyzing regional trade data.[4] The data used in this article include information on the export behavior of 8,300 firms located in four Central European countries (Austria, Czech Republic, Slovakia and Hungary) for different destination countries. In the empirical analysis the export propensity (extensive margin) and the export volume (intensive margin) is estimated. I am therefore able to infer whether an increase in export activity due to a large number of immigrants comes from a reduction in fixed and/or variable costs of exporting. In contrast to most other empirical articles I do not restrict the analysis to firms located in a single country, but analyze the

[3] Koening et al. (2010) use export volumes (in tons) rather than export values (sales).

[4] Peri and Requena-Silvente (2010) – despite using regional trade data – decompose the trade effect of immigrants in its impact on the number of transaction (shipments) and on the change in the average volume of a transaction and denote these effects as extensive and intensive margins, respectively. They use transactions rather than firms to distinguish between these two effects as they cannot identify the exporting firm (only the exporting province). Their estimated effect of immigration on the extensive margin is therefore overestimated at the expense of the intensive margin (when applying the definition used in Chaney, 2008), because an increase in the number of trading partners or in the frequency of transactions between existing trading partners by one firm is (misleadingly) attributed to the extensive margin rather than to the intensive margin.

export decisions of firms located in adjacent, but economically and historically very different countries.

The remainder of the article is structured as follows: The next section 2 describes the data. In section 3 I present the empirical model and discuss econometric issues. The results of the model estimating the export propensity and the export volume are described in section 4 and section 5 provides different model specifications to demonstrate the robustness of the results. Section 6 concludes.

2. Data

The main data source is a survey conducted among 8,299 firms located in Austria, the Czech Republic, Hungary and Slovakia. The survey was carried out between September and November 2010, but firms reported information of 2009. In this survey firms were asked whether they make sales abroad and if so, they reported their export behavior for a predetermined set of destination countries. The number of destinations ranges between 8 to 16 countries, depending on the country the firm is located. The number of observations for all combinations of countries of origin and destinations is summarized in Table 1. The data collected within the survey also include total sales, volume of sales the firm makes abroad, and the share of export turnover attained in a certain destination country. Based on this information the volume of sales in each destination as well as the share of export turnover in a target country among total sales can be calculated. The data include information on the age and the size (number of employees) of the firm, on ownership and firm structure, on the location of the firm (at the district level) and on the industry the firm belongs to (at the one-digit NACE level). The data set was supplemented by data on GDP and GDP per capita and on population density of the NUTS-2 region, where the firm is located, and on the on GDP and GDP per capita of the destination country. This information comes from Eurostat.[5] Data for the home region are from 2007 (to avoid concerns about endogeneity, see below) and from 2009 for the destination countries. Based on the district of the firm and the capital of the destination country the Euclidean distance is calculated. Data on migration was provided by European Labour Force Survey (LFS) on a regional level (NUTS-2) from 2007.

< Table 1 around here >

Table 2 shows a detailed description of the variables used in the regression analysis. The export propensity is a binary variable and takes the value 1 if a firm exports to a particular destination country. Whereas 1,120 (13,5%) out of 8,299 firms export to at least one of the predetermined destination countries, only 2,575 observations (2,9%) out of more than 87,000 firm-destination pairs

[5] Information on GDP and GDP per capita of Russia, Ukraine and Serbia are not published by Eurostat and come from the IMF.

report export activity. This low figure can be explained by the data sample that contains mainly small and medium sized enterprises. Note that nearly 40 percent of the firms have less than 10, and more than 80 percent have less than 100 employees.[6] The number of observations for the volume and the share of sales drops to 1,056, as only exporting firms are included in estimating the intensive margin and as firms are more reluctant in reporting their sales. As the survey includes information on total sales, on the volume of sales abroad and on the share of sales abroad (over total sales), observations where the figures reported to these questions were inconsistent are excluded from the sample. To estimate the volume of sales I use the absolute export volume (in million Euros, denoted as "Sales") and the relative export volume (share of sales in a particular destination country over total sales, denoted as "Share"). The export value of firms exporting to a particular country averages 2.2 million Euros or 14.9 percent of total sales. Note the large variation, especially when considering the absolute volume of sales.

< Table 2 around here >

The variable on immigration is calculated as the share of immigrants from a particular country over all residents in each NUTS-2 region. The geographic area, where all firms are located (Austria, Czech Republic, Hungary and Slovakia) includes 28 NUTS-2 regions. I take the share rather than the absolute number to account for differences in size of the regions. The average share of immigrants is 0.25 percent and ranges from 0 to 3.5 percent. I expect that the share of immigrants increases the export propensity, but have no clear prediction on the intensive margin, as immigrants might reduce fixed costs of exports only. Personal ties of migrants to their home country might be important to build trust among trading partners abroad to start export relations, but might have little influence afterwards. Language skills, on the other hand, will not only facilitate to set up export relations, but also to maintain export relation and to expand the export volume in a particular country.

The distance between the firm and the (capital of the) destination country is expected to decrease the intensive and the extensive margin. Sharing a common border and speaking the same or a similar language[7] in the home and in the destination country should reduce trade costs and therefore increase the export activities to these countries. I expect to find a similar effect if the destination country is (like all home countries) a member of the European Union (EU). The size of the market in the destination country (GDP and GDP per capita) is expected to increase export propensity and export volume, whereas economic theory does not provide clear predictions on the effect of the size

[6] Although most firms in the sample are small and medium sized enterprises, large firms are slightly overrepresented.

[7] Within the term "same or similar language" Austria, Germany and Switzerland as well as the Czech Republic and Slovakia are pooled together, although German is the main language only in parts of Switzerland and the Czech and the Slovakian languages are slightly different.

of the home region market. A larger home market could be associated with less need for expanding business abroad. Economic theory predicts a positive impact of a higher population density in the home region, as agglomeration is usually associated with higher productivity (see e.g. Rice et al., 2006), which should increase export participation as well as export volume. I expect that firm size, age, international ownership and belonging to a corporate group increases international activities due to higher productivity and better access to financial resources.

Figure 1 gives a first glance on the relationship between the export probability and the share of immigrants. The share of immigrants in a region from a destination country is plotted against the share of firms in the region that export to this particular country. The first (left) figure uses all destination countries, whereas the second (right) figure focuses on the countries where the firms are located (Austria, Czech Republic, Hungary and Slovakia) as export destinations. Both variables are in logarithmic terms. The figures give a first hint on the positive relationship between immigration and export activities of firms.

< Figure 1 around here >

3. Empirical Model and Econometric Concerns

To investigate the impact of migration on the export behavior of firms I estimate the influence of migration on the propensity of being an exporter and on the export volume (of exporting firms). Based on Chaney's (2008) terminology the first (second) effect is referred to as the extensive (intensive) margin. Based on the parameter estimates (presented in section 4) I will infer in section 5, whether migrants affect the export decision of firms due to reducing fixed and/or variable costs of exporting.

Export Propensity

The profit function of firms depending on their export behavior is unobservable, but the sample provides information whether a firm exports to a particular country. I therefore have to deal with a binary endogenous variable, which gives rise to a probit specification:

$$P(X_{frd} > 0) = \begin{matrix} 1 \\ 0 \end{matrix} \quad \begin{matrix} \text{if } \alpha + \beta \ln IMM_{rd} + \Omega_{rd}\kappa + \Gamma_r\delta + \Psi_d\lambda + \Upsilon_f\theta + \eta_f + \mu_d + \varepsilon_{frd} > 0 \\ \text{otherwise} \end{matrix} \tag{3}$$

The probability of firm *f* located in region *r* exporting to destination country *d* (and therefore $X_{frd} > 0$) depends on a constant term, on the share of immigrants (among all residents) from country *d* settled in region *r* (IMM_{rd}), and on other variables depending on both home region *r* and destination country *d* (distance, common border, same language), summarized in Ω_{rd}. Γ_r includes

home region specific variables, Ψ_d variables varying over destination countries, and Υ_f summarizes firm specific effects. α, β, κ , δ, λ and θ are the corresponding parameters to be estimated. η_f and μ_d are firm-specific and destination country specific fixed effects, to control for unobserved firm or destination country characteristics.[8] ε_{frd} are the *IID* disturbances. All variables (except dummy variables) are included in a logarithmic functional form.

Obviously, I cannot identify all effects in equation (3), as the firm-level fixed effects wipe out the firm specific variables (Υ_f) and the home region characteristics (Γ_r). The impact of the destination specific variables (Ψ_d) cannot be identified when destination country fixed effects are present. As the fixed effects control for unobserved variables that might influence both migration and export behavior (and may lead to biased parameter estimates), firm- and destination-fixed effects are included in one model specification. η_f and/or μ_d are, however, left out in alternative model configurations to be able to estimate the corresponding parameters on firm, region and destination characteristics and to demonstrate the robustness of the main findings.

Export Volume

To estimate the intensive margin the binary dependent variable from equation (3) is replaced by the logarithmic value of the volume of sales ($\ln X_{frd}$), and only those firms that actually export to a particular destination country are considered (if $X_{frd} > 0$). The linear relationship can be stated as follows:

$$\ln X_{frd} = \rho + \varphi \ln IMM_{rd} + \Omega_{rd}\phi + \Gamma_r\omega + \Psi_d\pi + \Upsilon_f\nu + \eta_f + \mu_d + \varepsilon_{frd} \quad \text{if} \quad X_{frd} > 0 \qquad (4)$$

The variables included in equation (4) are the same as in the regression estimating the export propensity. The corresponding parameters are ρ, φ, ϕ, ω , π and ν. All variables except dummy variables are included in logarithmic terms. Due to the linear character of the model the estimated coefficients can be directly interpreted as elasticities.[9] The model structure with respect to including or excluding fixed firm and/or destination country effects is the same as in the probit model: The preferred model again includes both firm and destination fixed effects. If I exclude firm-level fixed effects, η_f is included as a random individual (firm) effect with $\eta_f \sim IID\left(0, \sigma_\eta^2\right)$. ε_{frd} is the remainder error with $\varepsilon_{frd} \sim IID(0, \sigma_\varepsilon^2)$.

Elasticities

[8] I use destination-industry fixed effects (instead of fixed destination effects) in the empirical analysis, but neglect this information in equation (3) to keep the notation as simple as possible. Some empirical specifications include region-specific fixed effects (instead of fixed firm effects), which is also left out in equation (3) for convenience.

[9] The parameters of the dummy variables are semi-elasticities.

The extensive margin elasticity, ϑ, is defined as the relative change in the probability of exporting to a particular destination, associated with a relative change in the stock of immigrants (coming from that country) in the region, where the firm is located. The intensive margin elasticity, ζ, is the relative change in the volume of sales over the relative change in the stock of immigrants. Both elasticities can be summarized as follows:

$$\vartheta \equiv \frac{\partial P(X_{frd} > 0)}{\partial IMM_{rd}} \times \frac{IMM_{rd}}{P(X_{frd} > 0)} = \frac{\partial P(X_{frd} > 0)}{\partial \ln IMM_{rd}} \times \frac{1}{P(X_{frd} > 0)} \quad (5)$$

$$\zeta \equiv \frac{\partial X_{frd}}{\partial IMM_{rd}} \times \frac{IMM_{rd}}{X_{frd}} = \frac{\partial \ln(X_{frd})}{\partial \ln IMM_{rd}} = \hat{\varphi} \quad (6)$$

As the variable on immigration is incorporated in logarithmic terms, the parameter estimates of the regressions on the volume of sales can be directly interpreted as the intensive margin elasticity ($\zeta = \hat{\varphi}$). This is not the case in the probit model due to its non-linear character. Based on the regression results I calculate the marginal effect for the average firm ($\frac{\partial P(X_{frd}>0)}{\partial \ln IMM_{rd}}$) and use the marginal effect and the estimated probability of exporting to a particular country (for the average firm) to calculate the extensive margin elasticity (ϑ). Note that in the probit model the elasticity of the average firm will in general not equal the average elasticity (as in the panel estimation on the volume of sales).[10]

Econometric Issues

The data sample can be described as an unbalanced panel with firms and destination countries as the two dimensions. As the sample is restricted to one time period, I cannot identify the effect of migration on export behavior over time. The identification stems from the variation of the variable IMM_{rd} over the home regions of the firms and over destination countries. Basically, the variable on migration can be split into a constant (immigration averaged over all regions and all destination countries), into a region-specific deviation from that average (some regions attract more immigrants than others), into a destination country-specific effect (there are more migrants from some countries than from others), and into a part that indicates the deviation of the variable IMM_{rd} from the sum of the constant, and the region- and the destination-specific deviations. In one model specification I include firm and destination-industry fixed effects into the estimation equation. Therefore, the identification of the effect of migrants on the export decision of firms comes from variations of this

[10] The definition of the extensive margin elasticity is slightly different to Chaney (2008). He defines the extensive margin as the contribution of the export volumes by firms that start exporting (due to a reduction in fixed or variable export costs). I estimate the impact of a reduction in export costs on the probability of firms to export, but do not take their export volumes into account.

variables controlling for region and destination effects. Excluding either the firm-level or the destination fixed effects allows for more variation in the data (as differences between regions and/or destination countries matter), but fails to control for unobserved effects, which might lead to biased results. I show that the results of the models are rather robust with respect to the inclusion (or exclusion) of different types of fixed effects. Besides IMM_{rd}, the other variables indicating region and destination characteristics take the expected signs in most model specifications.

There are great concerns on the endogeneity of the firm specific variables in the data, especially firm size (number of employees) and age. Bernard and Jensen (1999) not only find that larger firms are more likely to become exporters, but also that employment growth and the probability of survival are higher for exporting firms. The causality between export behavior and these explanatory variables is therefore unclear and the corresponding coefficients might be biased. Articles applying panel data usually take the lagged values of some or all explanatory variables (e.g. Berman and Hèricourt, 2010; Koening et al., 2010), which is not possible using cross-sectional data only. Therefore, all firm-specific variables are left out of the regressions in the preferred specifications in section 4. To test for robustness I include these variables in the regression equation but use these variables only as controls for firm heterogeneity and do not interpret the parameter values and the significance levels of the respective variables. Parameter values and significance levels of migration are hardly affected by the inclusion of firm-specific variables. When using fixed firm effects, these variables drop out of the equation.

There might be similar concerns about reverse causality and simultaneity of the estimated effect of the variable on immigration, as foreign activities of a firm might attract migrants from the destination countries either directly or indirectly (as exporting firms are more successful and contribute to a prospering regional economy). Both the direct and the indirect effect caused by a single firm are negligibly small, as the migration variable is calculated on a regional level. Additionally, I lag the migration variable by two years and take the stock of migrants from 2007. As the export intensity of firms in a region influences economic variables positively and – besides external migration – might also lead to population growth due to internal migration I also lag the region-specific variables (GDP, GDP per capita and the population density) by two years.

There might be omitted variables that influence both, immigration and export behavior. For example, Meltiz and Ottaviano (2008) show in a theoretical model that agglomeration (bigger markets) leads to (on average) larger and more productive firms. Marshallian externalities might be another reason why firms might be more productive and, therefore, more likely to be exporters in regions with a high firm density. Studies on the location choice of migrants (see, e.g., Nowotny and Pennerstorfer, 2011) find that more agglomerated regions (with respect to population and economic activities) are

preferred destinations by new migrants. I address this issue by including the population density of the region where the firm is located as a proxy for agglomeration as well as GDP per capita of that region (both variables lagged by two years) and – in some model specifications – region-specific (more precisely: region-industry-specific) fixed effects. In- or exclusion of this type of fixed effects does not alter the main findings.

Another econometric concern arises as export decisions of firms for different destination countries (87,393 observations) are explained by variables that vary only between (28) home regions, (18) destination countries or – as the variable on migration – between (321) combinations of home regions and destination countries. As described in Moulton (1990) this might lead to standard errors that are biased downwards. I address this issue by clustering the residuals with respect to each home region-destination country combination in the probit models (estimating the export probability) and by using heteroscedasticity consistent estimates of the covariance matrix (White, 1980) in the random effects models (estimating export volumes).

When estimating the export volumes, only observations that report export activity are included in the analysis. As the selection of this sample is likely to be a non-random selection of all observations, I correct for the potentially biasing non-random sample selection using a Heckman (1976) type two-stage procedure as a robustness check. In the first stage I estimate a probit model whether a firm exports to a particular country and reports the respective export volume. In this estimation all exogenous variables from the second stage regression and a large number of combinations of fixed region, destination and industry effects are used as regressors. From the results of the probit model I calculate the inverse Mills' ratio and include this ratio as an additional explanatory variable in the second stage regression.[11]

Last, the selection of firms included in the survey is non-random, but the data sample is stratified with respect to industry, home region and firm size (number of employees). I control for industry effects by including respective dummy variables in each regression. In some model I consider fixed home region or firm effects or the – potentially endogenous – number of employees. Including home region fixed effects or the firm size does not alter the main findings, which serves as evidence that the effect of immigrants on the export decisions of firms is similar between regions and independent of firm size.

4. Results

[11] The inverse Mills' ratio is the ratio between the standard normal probability distribution function and standard normal cumulative distribution function, evaluated for each observation at the linear prediction of the probit model (Wooldridge, 2002).

The extensive margin elasticity

The results of the probit models estimating the probability of exporting to a particular country are summarized in Table 3. I find a positive and statistically significant effect of the share of immigrants of a particular country on the probability of a firm to export to this destination throughout all model specifications.

The model specifications differ on the type of fixed effects included in the regressions. Specification [1] includes dummy variables for industries, model [2] for region-industry combinations, specification [3] for destination-industry and column [4] for both region-industry and destination-industry combinations. Specification [5] controls for fixed firm effects and model [6] also for destination-industry fixed effects. Note that the number of observations drops sharply to about 10 percent of the total sample in specification [5] and [6]. Due to including fixed firm effects, the export decisions of a firm have to vary across different destination countries. All firms that do not export to one of the destination countries drop out of the regression, as their behavior is perfectly predicted by the fixed firm effects.[12] Different types of fixed effects control for various unobserved variables and reduce the variation of the immigration variable (necessary for identifying its influence on the export propensity) to variation between different destinations countries (model [2] and [5]) or between different regions (model [3]). In specification [4] and [6] identification comes from deviations from the region and the destination mean only. Region- (destination-) specific variables drop out of the equation when including region- (destination-) fixed effects due to multicollinearity.

Irrespective of the model specification I find a positive coefficient for immigration that is statistically significant at the one percent level. In specification [1] to [4] the parameter estimates vary between 0.112 and 0.144. The estimated coefficient is higher in specification [5] (0.314) and [6] (0.334).

The parameter estimates on the distance between the districts, where the firms are located, and the capital of the destination countries take the expected negative signs, but are significantly different from zero only if destination-specific fixed effects are excluded. Contrary to the effect of immigrants the variation between the geographic areas, where all firms are located, is not strong enough to ensure a statistically significant negative relationship. This result might also be a consequence of the fact that the measure of distance used in the analysis is not very accurate, as the distance to the capital of a country might be a poor proxy of the (relevant) distance to trading partners, especially if the destination country is large (e.g. Russia) or the economic centers of a country are far away from the capital (e.g. Germany). The dummy variables whether home and destination country share a

[12] All firms that export to all destinations also have to be dropped. These are, however, only 29 firms that account for less than 0.4 percent of the entire sample.

common border or speak the same language take a positive sign and are significantly different from zero in most model specifications, as expected.

The regression analysis does not provide statistically significant results for the relationship between the GDP in the home region and export propensity, a larger GDP per capita however dampens export activities. It seems that a wealthier home market induces less need to expand business abroad. The parameter estimate on the population density is, however, not significantly different from zero. Surprisingly, whether the trading partner is (also) a member of the European Union (EU) does not influence the export propensity. One reason for this result might be that there are only a few destination countries that are not members of the EU (namely Switzerland, Serbia, Croatia, Ukraine and Russia) that are probably very heterogeneous with respect to their trade barriers. The market size of the destination country (GDP and GDP per capita), however, takes the expected positive sign and is significantly different from zero throughout all model specifications.

< Table 3 around here >

The marginal effects and the extensive margin elasticities are reported in Table 4 and are calculated at means. I follow Koenig et al. (2010) and Berman and Héricourt (2010) and denote the impact on the probability of a firm to export (or to start exporting) as the extensive margin of trade. Note that the elasticities reported in Table 4 are slightly different compared to the extensive margin elasticity defined by Chaney (2008). In his model, the extensive margin elasticity is the (relative) increase in trade volume coming from additional exporters. The elasticities presented in Table 4 are the (relative) increase in the number of exporters. As export propensity and export volume (see below) are positively correlated with firm size, it is likely that new exporters (due to a reduction in trade costs) are smaller and (therefore) export less compared to the average of the firms already exporting. The elasticities derived in Table 4 therefore overestimate the extensive margin elasticity. Nevertheless, the elasticities are useful to compare the size of the impact of immigration on the export propensity to its effect on export volume.

Note that the export probability of the average firm-destination combination differs considerably between the models. The export propensity when including fixed firm effects (model [5] and [6]) is about 14 percent, compared to roughly 2 percent otherwise, as all firms that do not export to any of the potential destination countries are left out in these specifications. But as most marginal effects increase even more strongly than the export probability, the elasticities tend to be higher (in absolute values) when controlling for unobserved firm effects (specifications [5] and [6]). The

extensive margin elasticity of immigration is 0.489 (model [5]) and 0.530 (model [6]) if fixed firm effects are included and takes values between 0.266 and 0.349 if they are left out.[13]

The calculated elasticities with respect to distance are about –0.3 when destination-dummies are excluded and insignificant otherwise. As the common border and the same language are binary variables the elasticities reported in Table 4 are semi-elasticities. Sharing a common border increases the export probability of a firm by 35.4 to 51.0 percent, except in model specification [4], where the elasticity is only 17.8 percent and not significantly different from zero. The semi-elasticity on the same language is far more volatile and takes values between 0.125 and 1.036. The GDP per capita of the home region has a strong negative impact on the export propensity (ranging between –0.301 and –0.276). The strong positive impact of the market size of the destination country is also reflected by the corresponding elasticities: A one percent increase in the GDP and the GDP per capita of the destination country increases the export probability roughly by one half (GDP per capita) and one fourth (GDP) of a percent.

< Table 4 around here >

The intensive margin elasticity

The parameter estimates for the intensive margins are summarized in Table 5 and Table 6. Both tables report the same specifications of the model (with respect to controlling for various fixed effects) for estimating the intensive margin as for estimating the export probabilities (see Table 3). The (logarithm of the) absolute export volume (volume of sales, Table 5) is the preferred endogenous variable, as this figure is more closely related to the theoretical model proposed by Chaney (2008) than the (logarithm of the) relative export volume (share of sales in a destination country over total sales, summarized in Table 6). The regression results on the relative export volume show the robustness of the main findings. As the endogenous and all but binary explanatory variables are included in logarithmic values the parameter estimates can be interpreted as elasticities directly.[14]

The parameter estimates of immigration on the export volume take values between 0.062 and 0.089 and are significantly different from zero (at least) at the ten percent level in five models and at the five percent level in two out of six specifications. Comparing the intensive margin elasticity to the extensive margin elasticity shows a much smaller effect on the export volume than on the export propensity.

[13] Note that I not multiply the elasticities by –1 as Chaney (2008).
[14] The parameter estimates of the binary variables are semi-elasticities.

The distance to the destination country is again sensitive to the inclusion of destination fixed effects, but is not statistically significant (at the five percent level) in any model. The parameter estimates on sharing a common border and on speaking the same language always take a positive sign, but the impact of speaking the same language is rather small and not significantly different from zero. Sharing a common border with the destination country increases export volumes (of exporting firms) between 24.8 and 40.4 percent. The variables describing the size and the agglomeration of the home region has no effect on the intensive margin, nor does the membership of the destination country to the EU. The size of the destination country plays an important role for the export volume: An increase in the GDP by 1 percent increases the export volume of exporting firms by roughly 0.15 percent. The influence of GDP per capita is even stronger in size, but not significantly different from zero.

< Table 5 around here >

Table 6 reports the parameter estimates of the relative export volumes to a particular destination country (sales to this country over total sales, denoted as *SHARE*). The results of the models including fixed firm effects are not reported, as the parameter estimates – except for the intercept – are identical to the parameter estimates on the absolute export volume (specification [5] and [6] in Table 5), as $\ln SHARE_{fd} = \ln \frac{SALES_{fd}}{TOTAL\ SALES_f} = \ln SALES_{fd} - \ln TOTAL\ SALES_f$ and as $\ln TOTAL\ SALES_f$ is controlled for by fixed firm effects. The parameters on immigration are significantly different from zero at the five percent level in three out of four specifications. The estimated elasticities range between 0.068 and 0.087 and are therefore very similar to the results obtained from the absolute export values. Again, the distance to the destination country and whether home region and destination country speak the same language has no impact on the export volume. Sharing a common border significantly increases the relative export volume in specification [3] and [4], but is insignificant in the other specifications.

The negative influence of GDP per capita is more pronounced as in the regressions on the absolute export volume and significantly different from zero. Whether the destination country is a member of the EU or not has no influence on the relative export volume, whereas the market size of the destination (measured by GDP) increases volumes with elasticities slightly below 0.20. The influence of the GDP per capita is again large in size, but not significantly different from zero.

< Table 6 around here >

I conclude that the influence of the share of immigrants on the (absolute and relative) export volume is much smaller than on the export propensity. While all parameter estimates take a positive sign, as

expected, only five (out of ten) parameters are significant at the five percent level. In three specifications the coefficients are only significantly different from zero at the ten percent level, while the parameter estimates are not statistically significant at all in two models. In most specifications the parameter estimates on the number of immigrants are at the edge of passing the five percent significance threshold.

5. Robustness

In Table 7 to 9 I re-estimate the export propensity and the export volume, but include firm-specific variables like firm size (number of employees), age, whether the firms are fully or partly owned by foreigners and whether the firm is an individual enterprise, the headquarter or the subsidiary of a corporate group. The results on the export probability (Table 7) are hardly affected by the inclusion of firms-specific variables. Due to endogeneity concerns I refrain from interpreting the parameter estimates, but use the respective variables as additional controls. Not a single parameter estimates drops below or passes the five percent significance level due to including these firm-specific regressors.

< Table 7 around here >

The parameter estimates of the variable on immigration increases slightly when estimating the absolute (Table 8) or the relative export volume (Table 9). As the estimated coefficients are only slightly below significance levels without including firm-specific variables (Table 5 and 6), the respective parameter estimates – despite a rather small increase in size – pass the five percent significance level in seven out of eight model specifications. Although the difference of the parameter estimates between the basic specifications and the robustness checks is still small, it is more pronounced compared to robustness checks on the export propensity. Note that the increase in the explanatory power of the regressions due to including firm-specific variables is larger when estimating the absolute rather than the relative export volume.

< Table 8 around here >

< Table 9 around here >

Table 10 summarizes the results of the second stage regression using a two stage Heckman procedure. In the first stage I estimate a probit model (selection equation). The endogenous variable is binary and takes the value 1 if the firm exports to a particular destination and reports its export volume. I use region-industry, destination-industry and region-destination fixed effects and the distance to the destination country as regressors in the first stage probit regression. All exogenous variables (despite distance) from the second stage regression vary with respect to home region,

destination country or region-destination combinations and drop out of the equation.[15] Due to the large number of fixed effects (and the subsequent perfect prediction of the export probabilities of some observations) the number of observations in the first stage regression is reduced to 44,490. Including a large number of variables in the first stage probit model is nonetheless reasonable, as it increases the explanatory power of the selection equation.

From the selection equation I calculate the inverse Mills' ration and include this variable as an additional regressor in the second stage equation.[16] This variable is significant in two specifications (SALES [11] and [13]), indicating biased parameter estimates due to a non-random selection of observations (for the second stage regression). In these two specifications I do not control region-specific fixed effects in the second stage and the size of the parameter estimates drops significantly by one third (compared to SALES [1] and [3] in Table 5) and is not statistically significant from zero anymore. The Mills' ratio is insignificant in specification [12] and [14] and the parameter estimates on immigration are (therefore) hardly affected due to correcting for the sample selection. Nevertheless, the coefficients on migration in the four model specifications summarized in Table 10 are insignificant in two models and significantly different from zero only at the ten percent level in the other two specifications, enriching doubts on the robustness of the effect of immigration on the export volume.

< Table 10 around here >

6. Summary and Conclusions

In this article I investigate empirically the link between exports and migration at the firm level. I use survey data that comprise detailed information on export behavior of firms located in four Central European countries (Austria, Hungary, Czech Republic and Slovakia) for different destination countries. The variable on immigration is calculated for each source country (and potential export destination) for each NUTS-2 region. I find a positive, statistically significant and economically meaningful effect of the share of immigrants from a particular country on the export propensity of firms located in that region to export to that particular destination (extensive margin elasticity). The effect of immigrants on the (absolute and relative) export volume (intensive margin elasticity), despite being positive in all models, is smaller in size and statistically insignificant in some specifications. Arguments put forward by Gould (1994) – language skills, knowledge about

[15] The distance is calculated as the distance between the district, where the firm is located, and the capital of the destination country and can therefore be included in the first stage probit regression.

[16] I report the results applying the Heckman method only for estimating absolute (rather than relative) export volumes, as this is the preferred measure to estimate the intensive margin elasticity. Estimates on the relative export volumes are very similar and are available from the author upon request.

preferences in and ties to their home country – can explain the causal relationship between export behavior of firms and the stock of immigrants residing in the region the firm is located.

As I do not estimate the productivity distribution of firms or the elasticity of substitution between different varieties of a good (see equation (1) and (2)), I cannot assess directly, whether immigrants reduce mainly fixed or variable costs. If immigrants reduce variable trade costs only, than the ratio between the intensive and the extensive margin elasticity – based on estimates on $\frac{\gamma}{(\sigma-1)}$ by Chaney (2008) and Eaton et al. (2008) – should equal 1 or 2 (see footnote 1). If the effect on trade comes from a reduction in fixed costs only, the intensive margin elasticity is unaffected and the respective ratio should be zero. Irrespective of the model specification the ratio between the estimated intensive and extensive margin elasticity of immigrants is roughly 0.25. As this ration is (relatively) close to zero and as the extensive margin elasticity is statistically insignificant in some model specifications I conclude that immigrants promote export activities to their home countries mainly by reducing fixed costs of trade.

From an economic policy perspective, the findings on the export behavior of firms contribute an additional aspect to political debates on migration. However, more insights on how migrants affect the export behavior of firms are necessary for governments to improve general conditions for migrants to secure that their skills are utilized most efficiently (e.g. by approving qualifications of migrants acquired in their home countries). Does the positive effect mainly come from migrants who start their own businesses, from firms utilizing the knowledge of its employees, or is information about a particular foreign market – due to a large number of migrants from that country residing in that region – simply "in the air", as Marshall (1920, p. 271) puts it? Explaining export decisions of firms by the country of birth of its employees creates endogeneity problems, as firms planning to enter an export market might hire employees with respective language (or other) skills. Thinking about suitable instruments, besides the number or the share of migrants calculated at a regional level, definitely is an issue. Another fruitful exercise to uncover how immigration affects export costs is to disentangle whether migrants increase the probability to enter an export market or the propensity to remain an exporter to that destination, as done – in a different context – by Berman and Héricourt (2010).

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Figures and Tables

Figure 1: Average Export Propensity by Region and Destination Country and Migration

All Destination country (left), Austria, Hungary, Czech Republic and Slovakia as destination countries (right). All values in logarithmic terms.

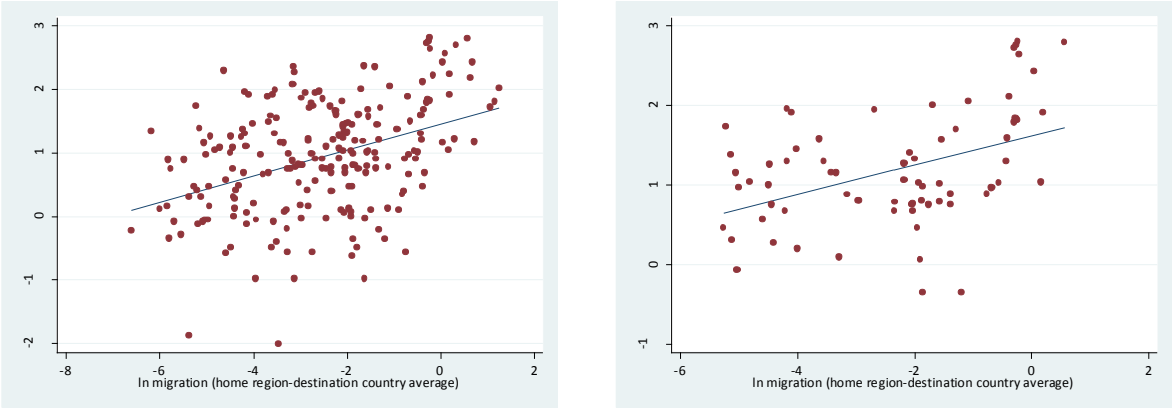

Table 1: Number of observations for each home-region and destination-country combination

Home Country / Destination	Austria	Czech Republic	Hungary	Slovakia	Total
Czech Republic	3,001	0	1,500	2,298	6,799
Hungary	3,001	0	0	2,298	5,299
Slovakia	3,001	1,500	1,500	0	6,001
Slovenia	3,001	0	1,500	0	4,501
Russia	3,001	1,500	1,500	0	6,001
Poland	3,001	1,500	0	2,298	6,799
Germany	3,001	1,500	1,500	2,298	8,299
Italy	3,001	1,500	1,500	0	6,001
Switzerland	3,001	0	1,500	0	4,501
Austria	0	1,500	1,500	2,298	5,298
Romania	0	1,500	1,500	2,298	5,298
Bulgaria	0	1,500	1,500	2,298	5,298
Ukraine	0	1,500	1,500	2,298	5,298
France	0	1,500	1,500	0	3,000
Great Britain	0	1,500	1,500	0	3,000
The Netherlands	0	1,500	1,500	0	3,000
Serbia	0	0	1,500	0	1,500
Croatia	0	0	1,500	0	1,500
Total	27,009	18,000	24,000	18,384	87,393

Table 2: Descriptive statistics

Variable	Variable Description	# of Obs.	Mean	Std. Dev.	Min	Max
Export propensity	Takes value 1 if firm *f* exports to destination country *d* and 0 otherwise	87,393	0.0295	0.1691	0	1
Sales	Volume of Sales (in Mio. Euro) of firm *f* in destination country *d*, if sales>0	1,056	2.1679	12.8788	0.0001	356.2500
Share	Share of Sales (in per cent) of firm *f* in destination country *d* over total sales, if sales>0	1,056	13.9634	19.2766	0.0427	100
Immigration	Number of residents in region *r* born in the destination country *d* divided by the total number of residents in region r	87,393	0.0025	0.0049	0	0.0354
Distance	Euclidean distance from the district capital of firm *f* to the capital of destination country *d* (in km)	86,861	653.7552	430.6001	30.7864	3,512.2970
Border	Takes value 1 of home country *c* and destination country *d* share a common border and 0 otherwise	87,393	0.5607		0	1
Language	Takes value 1 of home country *c* and destination country *d* share a common language and 0 otherwise	87,393	0.1030		0	1
GDP region	GDP of the home region *r* (in Bn. current Euros)	87,393	27.0157	22.4219	6.0631	72.6885
GDP / capita region	GDP per capita of the home region *r* (in 1,000 current Euros)	87,393	20.2795	12.8581	6.3	43.5000
Population density region	Population density of the home region *r* (in 1,000 residents per km²)	87,393	0.8014	1.4276	0.0555	4.0304
EU	Takes value 1 if destination country *d* is (also) a member of the European Union	87,393	0.7849		0	1
GDP destination	GDP of destination country *d* (in Bn. current Euros)	87,393	625.4471	771.9016	28.8211	2,374.5000
GDP / capita destination	GDP per capita of destination country *d* (in 1,000 current Euros)	87,393	18.5298	8.8559	1.8312	33.8000
Size	Number if employees of firm *f*	87,393	92.0475	758.9063	0	60,102
Age	Age of firm *f*	86,416	20.7641	21.4021	1	211
Foreign	Takes value 1 if firm *f* is partly foreign owned and 0 otherwise (reference group: owned domestically)	87,339	0.0961		0	1
Partly foreign	Takes value 1 if firm *f* is partly foreign owned and 0 otherwise (reference group: owned domestically)	87,339	0.0439		0	1
Headquarter	Takes value 1 if firm *f* is the headquarer of a corporate group and 0 otherwise (reference group: individual enterprise	87,357	0.0916		0	1
Subsidiary	Takes value 1 if firm *f* is the subsidiary of a corporate group and 0 otherwise (reference group: individual enterprise	87,357	0.0539		0	1

Note: Standard deviation on binary variables is not reported.

Table 3: Results of probit estimation on export propensity

Variable	PROP [1]	PROP [2]	PROP [3]	PROP [4]	PROP [5]	PROP [6]
ln Immigration	0.117 ***	0.144 ***	0.112 ***	0.142 ***	0.314 ***	0.334 ***
	(0.016)	(0.016)	(0.015)	(0.013)	(0.039)	(0.029)
ln Distance	–0.126 ***	–0.112 ***	–0.044	0.007	–0.228 ***	–0.016
	(0.044)	(0.041)	(0.047)	(0.044)	(0.086)	(0.084)
Border	0.182 ***	0.154 **	0.164 ***	0.076	0.342 ***	0.263 ***
	(0.056)	(0.060)	(0.051)	(0.047)	(0.128)	(0.097)
Language	0.184 **	0.137 **	0.128	0.050	0.551 ***	0.461 ***
	(0.083)	(0.063)	(0.093)	(0.062)	(0.125)	(0.135)
ln GDP region	0.036		0.036			
	(0.048)		(0.041)			
ln GDP / capita region	–0.114 **		–0.127 ***			
	(0.051)		(0.049)			
ln Population density region	0.001		0.003			
	(0.018)		(0.016)			
EU	0.030	–0.051			–0.016	
	(0.066)	(0.061)			(0.127)	
ln GDP destination	0.097 ***	0.090 ***			0.249 ***	
	(0.021)	(0.023)			(0.047)	
ln GDP / capita destination	0.169 ***	0.263 ***			0.460 ***	
	(0.050)	(0.046)			(0.105)	
constant	–3.272 ***	–5.341 ***	–0.537	–2.307 ***	–6.638 ***	–0.347
	(0.771)	(0.793)	(0.676)	(0.764)	(1.020)	(0.687)
Type of FE	industry	region-industry	destination-industry	region-industry destination-industry	firm	firm destination-industry
N	70,068	57,811	63,357	54,624	9,094	8,714
log likelihood	–9,244.92	–8,627.83	–9,039.26	–8,457.26	–3,298.72	–3,035.57

Notes: Standard errors in parentheses. Standard errors are clustered with respect to region-destination. *** (**) [*] denote the significance at the 1% (5%) [10%] level.

Table 4: Marginal effects and elasticities on the export probability

Variable	PROP [1]		PROP [2]		PROP [3]		PROP [4]		PROP [5]		PROP [6]	
Export Probability	0.020		0.020		0.023		0.020		0.149		0.141	
	Marg. Eff.	Elasticity	Marg. Eff.	Elasticity	Marg. Eff.	Elasticity	Marg. Eff.	Elasticity	Marg. Eff.	Elasticity	Marg. Eff.	Elasticity
ln Immigration	0.006	0.283	0.007	0.349	0.006	0.266	0.007	0.344	0.073	0.489	0.075	0.530
ln Distance	–0.006	–0.304	–0.006	–0.271	–0.002	–0.103	0.000	0.017	–0.053	–0.355	–0.004	–0.026
Border*	0.008	0.416	0.007	0.354	0.008	0.369	0.004	0.178	0.076	0.510	0.057	0.402
Language*	0.010	0.512	0.008	0.368	0.008	0.333	0.003	0.125	0.154	1.036	0.122	0.861
ln GDP region	0.002	0.087			0.002	0.086						
ln GDP / capita region	–0.006	–0.276			–0.007	–0.301						
ln Population density region	0.000	0.002			0.000	0.007						
EU*	0.001	0.071	–0.003	–0.128					–0.004	–0.025		
ln GDP destination	0.005	0.234	0.004	0.217					0.058	0.388		
ln GDP / capita destination	0.008	0.407	0.013	0.635					0.107	0.717		
Type of FE	industry		region-industry		destination-industry		region-industry destination-industry		firm		firm destination-industry	
N	70,068		57,811		63,357		54,624		9,094		8,714	

Notes: Marginal effects are computed at means. * denote that marginal effect is computed on a discrete change of a dummy variable from 0 to 1. The corresponding value of binary variables in the column reporting elasticity levels are semi-elasticities.

Table 5: Results on panel estimation on the absolute export volumes (sales)

Variable	SALES [1]	SALES [2]	SALES [3]	SALES [4]	SALES [5]	SALES [6]
ln Immigration	0.062 *	0.082 **	0.071	0.089 *	0.083 **	0.084 *
	(0.034)	(0.038)	(0.044)	(0.051)	(0.036)	(0.046)
ln Distance	–0.028	–0.040	0.160 *	0.172 *	–0.048	0.163 *
	(0.077)	(0.086)	(0.089)	(0.100)	(0.083)	(0.092)
Border	0.248 **	0.253 **	0.384 **	0.398 **	0.273 **	0.404 **
	(0.115)	(0.127)	(0.154)	(0.174)	(0.117)	(0.156)
Language	0.184	0.083	0.129	0.052	0.075	0.015
	(0.121)	(0.136)	(0.188)	(0.216)	(0.126)	(0.194)
ln GDP region	0.210		0.130			
	(0.252)		(0.270)			
ln GDP / capita region	–0.041		–0.133			
	(0.238)		(0.264)			
ln Population density region	–0.174		–0.128			
	(0.115)		(0.124)			
EU	0.132	0.046			0.062	
	(0.117)	(0.131)			(0.121)	
ln GDP destination	0.136 ***	0.140 ***			0.157 ***	
	(0.038)	(0.041)			(0.039)	
ln GDP / capita destination	0.165	0.212			0.216 *	
	(0.121)	(0.137)			(0.128)	
constant	–1.881	–1.151	1.854	0.660	1.276	4.008 ***
	(3.527)	(1.765)	(3.811)	(1.543)	(1.243)	(0.537)
Type of FE	industry	region-industry	destination-industry	region-industry destination-industry	firm	firm destination-industry
N	1,044	1,044	1,044	1,044	1,044	1,044
R^2	0.098	0.468	0.132	0.493	0.012	0.033

Notes: Standard errors in parentheses. Standard errors are based on heteroscedasticity consistent estimates of the covariance matrix (White, 1980). *** (**) [*] denote the significance at the 1% (5%) [10%] level.

Table 6: Results on panel estimation on the relative export volumes

Variable	SHARE [1]	SHARE [2]	SHARE [3]	SHARE [4]
ln Immigration	0.068 **	0.076 **	0.087 **	0.087 *
	(0.033)	(0.037)	(0.041)	(0.048)
ln Distance	–0.114	–0.095	0.097	0.147
	(0.072)	(0.084)	(0.084)	(0.095)
Border	0.175	0.195	0.331 **	0.356 **
	(0.108)	(0.123)	(0.139)	(0.167)
Language	0.135	0.076	0.036	0.015
	(0.111)	(0.128)	(0.171)	(0.202)
ln GDP region	0.159		0.096	
	(0.161)		(0.178)	
ln GDP / capita region	–0.678 ***		–0.797 ***	
	(0.167)		(0.187)	
ln Population density region	–0.006		0.040	
	(0.065)		(0.070)	
EU	0.100	0.043		
	(0.112)	(0.126)		
ln GDP destination	0.192 ***	0.182 ***		
	(0.036)	(0.040)		
ln GDP / capita destination	0.192 *	0.218 *		
	(0.113)	(0.131)		
constant	2.367	–1.566	7.658 ***	0.643
	(2.124)	(1.261)	(2.335)	(0.800)
Type of FE	industry	region-industry	destination-industry	region-industry destination-industry
N	1,044	1044	1,044	1044
R^2	0.184	0.431	0.257	0.496

Notes: Standard errors in parentheses. Standard errors are based on heteroscedasticity consistent estimates of the covariance matrix (White, 1980). *** (**) [*] denote the significance at the 1% (5%) [10%] level.

Table 7: Results of probit estimation on export propensity / robustness checks

Variable	PROP [7]	PROP [8]	PROP [9]	PROP [10]
ln Immigration	0.129 ***	0.149 ***	0.125 ***	0.148 ***
	(0.016)	(0.016)	(0.015)	(0.013)
ln Distance	–0.125 ***	–0.112 ***	–0.044	0.016
	(0.043)	(0.043)	(0.044)	(0.046)
Border	0.195 ***	0.162 ***	0.156 ***	0.079
	(0.054)	(0.061)	(0.049)	(0.048)
Language	0.162 **	0.141 **	0.107	0.047
	(0.072)	(0.062)	(0.081)	(0.062)
ln GDP region	–0.012		–0.010	
	(0.047)		(0.040)	
ln GDP / capita region	–0.100 **		–0.119 ***	
	(0.050)		(0.046)	
ln Population density region	0.023		0.025 *	
	(0.016)		(0.015)	
EU	–0.002	–0.054		
	(0.062)	(0.060)		
ln GDP destination	0.098 ***	0.094 ***		
	(0.021)	(0.023)		
ln GDP / capita destination	0.202 ***	0.276 ***		
	(0.048)	(0.046)		
constant	0.313 ***	0.354 ***	0.327 ***	0.359 ***
	(0.027)	(0.028)	(0.027)	(0.028)
(ln Size)²	–0.032 ***	–0.037 ***	–0.033 ***	–0.038 ***
	(0.004)	(0.004)	(0.004)	(0.004)
ln Age	–0.013	0.004	–0.010	0.005
	(0.014)	(0.015)	(0.014)	(0.015)
Foreign	0.278 ***	0.292 ***	0.286 ***	0.294 ***
	(0.039)	(0.037)	(0.039)	(0.038)
Partly foreign	0.414 ***	0.448 ***	0.429 ***	0.455 ***
	(0.050)	(0.053)	(0.051)	(0.055)
Headquarter	0.154 ***	0.142 ***	0.156 ***	0.144 ***
	(0.028)	(0.029)	(0.028)	(0.030)
Subsidiary	0.103 **	0.131 ***	0.114 ***	0.135 ***
	(0.042)	(0.045)	(0.043)	(0.046)
constant	–3.588 ***	–6.576 ***	–0.503	–3.438 ***
	(0.718)	(0.822)	(0.640)	(0.783)
Type of FE	industry	region-industry	destination-industry	region-industry destination-industry
N	69,217	57,096	62,625	53,982
log likelihood	–8,879.35	–8,286.65	–8,667.39	–8,114.13

Notes: Standard errors in parentheses. Standard errors are clustered with respect to region-destination. *** (**) [*] denote the significance at the 1% (5%) [10%] level.

Table 8: Results on panel estimation on the absolute export volumes (sales) / robustness check

Variable	SALES [7]	SALES [8]	SALES [9]	SALES [10]
ln Immigration	0.079 **	0.087 **	0.099 **	0.097 *
	(0.034)	(0.038)	(0.043)	(0.050)
ln Distance	–0.060	–0.050	0.123	0.173 *
	(0.075)	(0.085)	(0.088)	(0.098)
Border	0.222 *	0.235 *	0.357 **	0.380 **
	(0.113)	(0.126)	(0.152)	(0.172)
Language	0.142	0.065	0.093	0.031
	(0.118)	(0.132)	(0.184)	(0.209)
ln GDP region	0.062		–0.016	
	(0.236)		(0.251)	
ln GDP / capita region	–0.206		–0.335	
	(0.228)		(0.253)	
ln Population density region	0.021		0.073	
	(0.091)		(0.099)	
EU	0.101	0.043		
	(0.116)	(0.129)		
ln GDP destination	0.145 ***	0.142 ***		
	(0.037)	(0.041)		
ln GDP / capita destination	0.185	0.225 *		
	(0.119)	(0.136)		
constant	0.891 ***	0.713 **	0.948 ***	0.710 **
	(0.222)	(0.295)	(0.234)	(0.315)
(ln Size)²	–0.034	–0.010	–0.039	–0.007
	(0.031)	(0.040)	(0.032)	(0.043)
ln Age	–0.004	0.002	–0.004	0.001
	(0.008)	(0.009)	(0.009)	(0.010)
Foreign	0.633 **	0.644 **	0.543 *	0.582 *
	(0.267)	(0.306)	(0.285)	(0.334)
Partly foreign	0.548 **	0.839 ***	0.522 **	0.893 ***
	(0.221)	(0.306)	(0.244)	(0.337)
Headquarter	0.726 **	0.588 *	0.678 **	0.621 *
	(0.302)	(0.339)	(0.323)	(0.377)
Subsidiary	1.118 ***	1.190 ***	1.237 ***	1.278 ***
	(0.357)	(0.350)	(0.377)	(0.384)
constant	–0.462	–3.860 **	3.833	–1.878
	(3.291)	(1.551)	(3.483)	(1.203)
Type of FE	industry	region-industry	destination-industry	region-industry destination-industry
N	1,044	1,044	1,044	1,044
R^2	0.331	0.622	0.380	0.653

Notes: Standard errors in parentheses. Standard errors are based on heteroscedasticity consistent estimates of the covariance matrix (White, 1980). *** (**) [*] denote the significance at the 1% (5%) [10%] level.

Table 9: Results on panel estimation on the relative export volumes / robustness check

Variable	SHARE [5]	SHARE [6]	SHARE [7]	SHARE [8]
ln Immigration	0.077 **	0.078 **	0.103 **	0.093 **
	(0.033)	(0.037)	(0.040)	(0.048)
ln Distance	–0.111	–0.093	0.112	0.163
	(0.072)	(0.083)	(0.084)	(0.095)
Border	0.159	0.188	0.318 **	0.354 **
	(0.109)	(0.124)	(0.140)	(0.166)
Language	0.107	0.082	–0.003	0.005
	(0.111)	(0.127)	(0.171)	(0.199)
ln GDP region	0.211		0.148	
	(0.157)		(0.172)	
ln GDP / capita region	–0.595 ***		–0.722 ***	***
	(0.169)		(0.193)	
ln Population density region	–0.040		0.011	
	(0.066)		(0.070)	
EU	0.080	0.044		
	(0.112)	(0.126)		
ln GDP destination	0.190 ***	0.179 ***		
	(0.036)	(0.040)		
ln GDP / capita destination	0.229 **	0.231 *		
	(0.113)	(0.132)		
constant	–0.049	–0.101	0.017	–0.077
	(0.148)	(0.188)	(0.163)	(0.211)
(ln Size)²	0.003	0.000	–0.002	0.000
	(0.019)	(0.024)	(0.021)	(0.027)
ln Age	–0.008	–0.006	–0.008	–0.007
	(0.006)	(0.006)	(0.006)	(0.006)
Foreign	0.451 ***	0.475 **	0.390 **	0.448 **
	(0.156)	(0.199)	(0.166)	(0.218)
Partly foreign	0.526 ***	0.596 ***	0.504 ***	0.670 ***
	(0.185)	(0.220)	(0.193)	(0.240)
Headquarter	–0.033	–0.110	–0.079	–0.103
	(0.170)	(0.222)	(0.184)	(0.246)
Subsidiary	0.347	0.556 **	0.441 *	0.620 *
	(0.226)	(0.260)	(0.246)	(0.283)
constant	0.578	–1.146	6.100 **	1.015 **
	(2.200)	(1.294)	(2.412)	(0.902)
Type of FE	industry	region-industry	destination-industry	region-industry destination-industry
N	1,044	1,044	1,044	1,044
log likelihood	0.211	0.460	0.287	0.529

Notes: Standard errors in parentheses. Standard errors are based on heteroscedasticity consistent estimates of the covariance matrix (White, 1980). *** (**) [*] denote the significance at the 1% (5%) [10%] level.

Table 10: Results on panel estimation on the absolute export volumes (sales) using a two-stage procedure controlling for non-random sample selection / robustness check

Variable	SALES [11]	SALES [12]	SALES [13]	SALES [14]
ln Immigration	0.041	0.074 *	0.047	0.094 *
	(0.035)	(0.039)	(0.046)	(0.053)
ln Distance	0.009	–0.018	0.172 *	0.172 *
	(0.078)	(0.088)	(0.088)	(0.099)
Border	0.192	0.236 *	0.343 **	0.406 **
	(0.121)	(0.134)	(0.156)	(0.176)
Language	0.101	0.051	0.063	0.059
	(0.129)	(0.144)	(0.195)	(0.222)
ln GDP region	0.183		0.059	
	(0.246)		(0.264)	
ln GDP / capita region	0.002		–0.029	
	(0.230)		(0.256)	
ln Population density region	–0.112		–0.079	
	(0.116)		(0.124)	
EU	0.138	0.053		
	(0.121)	(0.135)		
ln GDP destination	0.102 **	0.126 ***		
	(0.041)	(0.045)		
ln GDP / capita destination	0.147	0.198		
	(0.120)	(0.137)		
constant	–0.403	–0.673	2.817	0.559
	(3.563)	(1.816)	(3.837)	(1.588)
Mills' ratio	–0.459 ***	–0.187	–0.354 *	0.065
	(0.166)	(0.200)	(0.199)	(0.234)
Type of FE	industry	region-industry	destination-industry	region-industry destination-industry
N (1st stage probit)	44,490	44,490	44,490	44,490
N (2nd stage regression)	1,028	1,028	1,028	1,028
R^2	0.097	0.445	0.133	0.470

Notes: Standard errors in parentheses. Standard errors are based on heteroscedasticity consistent estimates of the covariance matrix (White, 1980). *** (**) [*] denote the significance at the 1% (5%) [10%] level. In the 1st stage probit regression (selection equation) ln distance, region-industry, destination-industry and region-destination fixed effects are included as regressors.