Export, Migration, and Costs of Trade: Evidence from Central European Firms

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Export, Migration and Costs of Trade: Evidence from Central European Firms

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Abstract

This article analyzes the link between immigration and trade at the firm level, utilizing information on the export activities of 8,300 firms located in different Central European countries (Austria, Czech Republic, Slovakia and Hungary) for various export markets as well as regional data on immigration. The empirical analysis suggests a strong, economically meaningful and statistically significant impact of immigration on the export propensity (extensive margin), whereas the influence on firms' export volumes (intensive margin) is much smaller. This leads to the conclusion that immigrants promote export activities to their home countries mainly by reducing fixed costs of trade.

Keywords: Export behaviour Immigration Firm-level data Margins of trade

JEL classifications: F10, F22, R12

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1. Introduction

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 analysed ever since, it, however, took more than a century to link the issue of migration to foreign trade. GOULD (1994) was the first who analysed 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. The author links the costs of getting information of a particular country to the number of immigrants from that country and argues that immigrants can reduce trade costs to their home countries due to their specific skills and knowledge. In an empirical application of his model GOULD (1994) analyses 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.

Following GOULD (1994) there are quite a few articles investigating this issue that confirm Gould's results and find a positive relationship between migration and trade. Nearly all papers, however, use national or regional data to address this issue. Only very recently a small number of empirical articles emerged, investigating the link between migration and trade at the firm level (see section 2 for a literature review). The article contributes to the existing literature, as it is – as far as the author knows – the first paper that explains both the export propensity and the export volume by the regional stock of immigrants using individual (firm level) data. The empirical investigation draws on a data set that includes information on the export behaviour of 8,300 firms located in four Central European countries (Austria, Czech Republic, Slovakia and Hungary) for different destination countries.

The use of firm level data enables the evaluation of whether an increase in aggregate (regional or national) exports due to immigration comes from an increase in the number of exporting firms[1] (extensive margin) and/or in the export volume of exporters (intensive margin). Following CHANEY (2008), results on the extensive and intensive margins of trade can be related to the structure of trade costs, namely whether an increase in the export activities of firms due to a large number of immigrants stems from a reduction in fixed and/or variable costs of exporting. One is unable to distinguish between intensive and extensive margin when using regional data on aggregated trade flows (as long as the number of exporting firms is not available) and is therefore incapable of learning something about the link between immigration and the structure of firms' trade costs. The scope of this article can be summarized in three research questions:

RQ1: Does the number of immigrants from a particular country increase the probability of firms to export to this country (extensive margin)?

RQ2: Does the number of immigrants increase the export volume of exporting firms (intensive margin)?

RQ3: Do immigrants reduce fixed and/or variable export costs?

An additional contribution of this paper is that, in contrast to most other empirical articles, the analysis is not restricted to (regions of or firms located in) a single country, but analyses the export behaviour of (firms located in) adjacent, but economically and historically very different countries. These countries (and their regions) show very large differences in their immigration patterns and differ considerably with respect to the absolute number of immigrants, but also with respect to the importance of particular countries as source countries of immigration. The large variation across host regions and source countries of immigration facilitates identifying the trade enhancing effects of immigrants. As migration to these countries is not a recent phenomenon, long-run trade effects of migration can be derived.

2. Related Literature

Quite a large number of empirical articles investigating the links between trade patterns and immigration followed the pioneering work of GOULD (1994). BANDYOPADHYAY et al. (2008) and PERI and REQUENA-SILVENTE (2010) offer detailed literature reviews 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[2] differ considerably and range from 0.05 to 0.47. However, nearly all articles dealing with immigration and trade use country and regional information, while only a small number of articles utilize firm level data (see below). This is not surprising, as one cannot deduct hypotheses from GOULD's (1994) model to explain firm behaviour 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 analysing firm behaviour, as they extend KRUGMAN's (1980) gravity model on trade by introducing firm 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 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) analyses 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 do not affect the export volumes of exporting firms. Variable export costs influence both the export propensity and the export volume. An increase in the aggregate export volume due to a reduction in export costs can therefore stem from new exporters (the 'extensive

margin') and/or from an increase in export volumes of firms that already exported before the reduction in trade costs (the 'intensive 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 (CHANEY, 2008, p. 1716 f.):

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

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

X_{ij} denotes the trade volume from country *i* to *j*. σ indicates the elasticity of substitution between two varieties of goods of the same sector and γ describes the heterogeneity of firms with respect to productivity.[3]

This line of literature spurred research on the export propensity (extensive margin) and the export volume of exporters (intensive margin) using firm level data. These articles use different variables indicating export costs and relate their findings on intensive and extensive margins to the structure of trade costs: KOENIG et al. (2010) investigate the impact of spillover effects on the export decisions of more than 8,000 French firms, while BERMAN and HÉRICOURT (2010) analyse around 5,000 firms in 9 developing countries and investigate the impact of financial factors on entering the export market. KOENIG et al. (2010) find evidence of spillover effects on the export propensities, but not on export volumes. 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) find that better financial health increases the propensity of becoming an exporter, but does not impact the probability of a firm remaining an exporter, nor influence the export volume. The authors interpret these results as evidence of the existence of large sunk costs when entering the export market.

Recent contributions on the trade-migration nexus using firm-level data include articles by HATZIGEORGIOU and LODEFALK (2011) and HILLER (2013). HATZIGEORGIOU and LODEFALK (2011) analyse the trade creating effect of the ethnic composition of firms' workforces, but do not investigate the impact of the regional stock of immigrants. They find that immigrant workers increase both the number of exported products and the average export value. While HILLER (2013) includes both the composition of the workforce and the stock of regional immigrants in her analysis, she is interested in decomposing trade volumes to a firm's export destination into the number of exported products and the average value per traded product rather than analysing firm's composition of export destination

countries. Consequently, her dataset is restricted to firm-destinations with strictly positive export flows.

The present article is most closely related to PERI and REQUENA-SILVENTE (2010) and KOENING (2009). PERI and REQUENA-SILVENTE (2010) analyse trade flows between Spanish regions to 77 destination countries between 1995 and 2008. As they have information on the number of transactions (shipments) in addition to data on (regionally) aggregated trade flows they are able to decompose the trade effect of immigrants in its impact on the number of transactions and on the average volume of a transaction and denote these effects as extensive and intensive margins, respectively. 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. PERI and REQUENA-SILVENTE (2010) 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 (when applying the definition used in CHANEY, 2008), because an increase in the frequency of transactions between existing trading partners by one firm is attributed to the extensive margin rather than to the intensive margin.[4] KOENIG (2009) investigates the impact of regional migrant stocks on the export propensity of French firms and finds that an increase in the regional stock of immigrants by 10% increases the probability – and thus the number – of firms starting to export to the immigrants' home country by 1.2 percent. She closes her article by stating that '[t]he next step is to understand whether the presence of foreign populations has a larger effect on the number of exporting firms or on the volume exported by each producer', which is precisely the topic of the present article.

3. Conceptual Framework and Empirical Model

3.1 Link between Migration and Trade and its Spatial and Temporal Dimension

GOULD (1994), WAGNER et al. (2002) and HILLER (2013) argue that immigrants increase exports by having better knowledge about business opportunities and by being more likely to be connected with business networks in their countries of origin (enabling them to find customers or trading partners more easily). Immigrants are expected to have better knowledge about preferences of their country of origin and face lower communication barriers due to language skills. Additionally, they are more likely to have formal (legal system, institutions) and informal (local business practices, information on whom to trust) knowledge about their country of origin. HEAD and RIES (1998) use similar arguments and suspect that immigrants might serve as 'trade intermediaries' (p. 48) between the immigrants' host country and their country of origin.[5] All the skills and knowledge described above are personally bound to particular immigrants. Knowledge and skills can be exploited by firms employing immigrant workers or by the migrant herself/himself by setting up an own business. The knowledge embodied in the immigrant workers might also spill over to other enterprises, but as much of this type of

information can be considered as 'tacit knowledge' direct interaction (for example informal face-to-face contact) between the immigrant worker and employees from other firms is necessary (see below).

Most of the migrants' skills and knowledge are expected to help establishing export relations by reducing fixed trade costs. However, e.g. language skills or knowledge about the legal system of the immigrants' country of origin can also be expected to reduce variable trade costs and therefore increase both the export propensity and export volumes. Although e.g. lower costs of finding a trading partner will be most important for setting up trade relations, this might also facilitate finding additional trading partners in the respective country (and therefore increase export volumes). The analysis does not investigate the importance of different channels how immigrants affect firms' export behaviour, but estimates the extensive and the intensive margin elasticities. These results can nevertheless be used to assess to which extent an increase in exports comes from a reduction in fixed or variable trade costs: Based on the CHANEY (2008)-model the ratio between intensive and extensive margin elasticity lies in the interval between zero (if immigrants reduce only fixed export costs) and $(\sigma - 1)/[\gamma - (\sigma - 1)]$ (if only variable costs are influenced, see equation (1) and (2) above). The upper bound of the interval – based on estimates on $\gamma/(\sigma - 1)$ by CHANEY (2008) and EATON et al. (2008) (see endnote 3) – is expected to be between 1 or 2. A value of the ratio between intensive and extensive margin elasticity close to zero (1 or 2) will be interpreted as an indicator that immigrants influence mainly fixed (variable) costs of trade.

The potential trade enhancing effects of immigrants will take time to become effective after the immigrants' arrival in the host country (time dimension) and the spatial scale of the effect is likely to be limited (spatial dimension). According to the time dimension one has to note that the knowledge of immigrants, such as personal ties and knowledge about consumers' preferences in their country of origin might be difficult to exploit unless immigrants have learned about administrative and social norms of their host country and unless they have found jobs or founded businesses. As it might take time for immigrants to become well-established members of the host country's society, the effect of immigration on export costs will evolve over time. On the other hand, personal ties to their country of origin get weaker if immigrants stay in the host country for longer periods. The data allows me to differentiate immigrants by their length of stay and account for this (potentially) different impact (see Appendix B)[6].

The spatial dimension of the effect of immigrants on firms' trade behaviour is typically limited. First, the spatial scale of the exploitability of the immigrant's knowledge by employing immigrant workers is restricted by the maximum commuting distance the migrant is willing to incur. Second, the spatial range of knowledge spillovers of tacit knowledge (from firms employing immigrant workers or from businesses run by immigrants to other firms) is limited (see DÖRING and SCHNELLENBACH (2006) for an excellent overview). The spatial range of the usability of migrants' skills and knowledge as well as the respective spillover effects is (usually implicitly) embodied in the regional unit of aggregation of

the analysis. In empirical studies analysing the link between migration and trade at the sub-national level the regional level of aggregation differs considerably: While PERI and REQUENA-SILVENTE (2010) and HILLER (2013) use the immigrant stock at the NUTS-3 level and BRIANT et al. (2009) use French Departments as the relevant regional unit, BANDYOPADHYAY et al. (2008) and DUNLEVY (2006) use US-states and WAGNER et al. (2002) Canadian provinces. In the present article regional information on immigrants in NUTS-2 regions are used for two reasons: First, the NUTS-2-regions in the area under investigation have on average 1.2 million inhabitants and are less than 11,000 km² large. The distance between the district capitals and the capital of the respective NUTS-2 region averages 50 km air-line distance, which is well within the range of a daily commuting distance. According to the spatial scale of knowledge spillovers DÖRING and SCHNELLENBACH (2006) note that 'no consensus is reached about the spatial range that can be attributed to knowledge spillovers' (p. 384), as only a few empirical articles estimate the spatial scale explicitly. In different contexts ANSELIN et al. (1997) find spillover effects of university research on firms' innovation activities over a range up to 50 miles, and FUNKE and NIEBUHR (2005) find evidence that R&D activities spill over to neighbouring regions, but the strength of spillover effects declines by 50% over a range of 23 kilometres. Based on the magnitude of acceptable commuting distances and on the spatial scale of spillover effects of (to some degree) tacit knowledge NUTS-2 level seems to be a reasonable choice as the relevant unit of spatial aggregation. Second, this level of regional aggregation is preferred due to data availability: Data on immigration is provided from the European Labour Force Survey (from 2007) and is based on regular questionnaires surveyed among a representative sample of households. While the regional migrant stock is therefore comparable across different European countries the variable would not be representative at a regionally more disaggregated level.

Intuitively there are two variables appropriate to measure the size of regional immigrant communities, namely the absolute number of immigrants or their share among the entire regional population. Most channels how immigrants might affect firms' export behaviour depend on their absolute number, like the chance of finding an immigrant worker (with the respective skills and knowledge) or the aggregate number of personal ties to a particular country firms can potentially draw on. Consequently, the absolute number of immigrants is used in most empirical studies to explain trade flows (see e.g. HILLER, 2013; KOENIG, 2009; WAGNER et al., 2002, or PERI and REQUENA-SILVENTE, 2010), whereas the share of immigrants among the entire population is rarely incorporated (RAUCH and TRINDADE (2002) are an exception). Similarly, articles analysing export spillovers (KOENIG et al., 2010) or – more generally – knowledge spillovers (see e.g. HENDERSON, 2003, and BALDWIN et al., 2008) typically approximate the source of knowledge spillovers by the absolute number of respective firms rather than its share. However, in some cases the probability of a randomly drawn person of being an immigrant from a particular country is more relevant, which suggests the use of the relative rather than the absolute size of migrant communities. If, for example, information spillover effects depend on informal face-to-face contacts with workers from other firms, the probability of the other firm's

worker of being an immigrant from a particular country of origin will be better approximated by the share of immigrants (a similar argument is stressed by RAUCH and TRINDADE, 2002). Additionally, immigrants might increase exports by starting their own businesses and setting up trade relations to their country of origin. In this case the ethnicity of the owner of a randomly drawn firm is also better approximated by the relative size of a migrant community. Nevertheless we follow the majority of empirical articles and use the absolute number of immigrants as the key variable of interest, but use the share of immigrants among the entire regional population in the sensitivity analysis (see Appendix B).

3.2 Export Propensity

The profit function of firms depending on their export behaviour is unobservable, but the sample provides information whether a firm exports to a particular country. The binary nature of the endogenous variable (when estimating the export propensity) gives rise to a probit specification:

$$P(X_{frd} > 0) = \begin{matrix} 1 \\ 0 \end{matrix} \quad \begin{matrix} \text{if } \alpha + \beta \ln IMM_{rd} + \boldsymbol{\Omega}_{rd}\boldsymbol{\kappa} + \boldsymbol{\Gamma}_r\boldsymbol{\delta} + \boldsymbol{\Psi}_d\boldsymbol{\lambda} + \boldsymbol{\Upsilon}_f\boldsymbol{\theta} + \iota_f + \mu_d + \varepsilon_{frd} > 0 \\ \text{otherwise} \end{matrix} \tag{3}$$

The probability of firm *f* located in region *r* exporting to destination country *d* (characterized by a strictly positive export volume, $X_{frd} > 0$) depends on a constant term, on the number of immigrants from country *d* residing in region *r* (IMM_{rd}), and on other variables depending on both home region *r* and destination country *d* (measures of geographical and cultural distance), summarized in $\boldsymbol{\Omega}_{rd}$. $\boldsymbol{\Gamma}_r$ includes home region specific variables, $\boldsymbol{\Psi}_d$ variables varying over destination countries, and $\boldsymbol{\Upsilon}_f$ summarizes firm specific effects. α, β, $\boldsymbol{\kappa}$, $\boldsymbol{\delta}$, $\boldsymbol{\lambda}$ and $\boldsymbol{\theta}$ are the corresponding parameters to be estimated. ι_f and μ_d are firm specific and destination country specific fixed effects, to control for unobserved firm, region or destination country characteristics.[7] ε_{frd} are the *IID* disturbances. All variables (except dummy and index variables) are included in a logarithmic functional form.

Obviously, in equation (3) not all effects are identified, as firm fixed effects wipe out firm ($\boldsymbol{\Upsilon}_f$) and home region characteristics ($\boldsymbol{\Gamma}_r$), and the impact of the destination specific variables ($\boldsymbol{\Psi}_d$) 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 behaviour (and may lead to biased parameter estimates), firm and destination fixed effects are included in one model specification. ι_f and/or μ_d are, however, left out in alternative model configurations to be able to estimate the corresponding parameters on region and destination characteristics and to demonstrate the robustness of the main findings. Note that IMM_{rd} is identified even if firm and destination fixed effects are present.

The effect of immigration on firms' choice of export destinations can only be identified if variation in the choice of destination countries is observed. As identification comes from firms that export to at

least one destination country, this poses the question whether all firms should be included in the empirical analysis or whether the sample should be restricted to firms exporting to at least one country ('exporters') only. Using all firms is more closely in the spirit of the CHANEY (2008)-model, where the export choice of a particular firm to one country is independent of its export choice to other countries due to the assumptions of the model (in particular due to constant marginal production costs and cost independence between trade costs to different countries). The sample is nevertheless restricted to exporting firms in the main specification for three reasons (while regression results on the entire sample are reported in Appendix B only): (i) The decisions on a firm's export behaviour might be hierarchical with deciding on export status first, and then about export destinations and export volumes. In this article the focus lies on explaining the composition of export destination countries rather than on becoming an exporter at all. (ii) Including firm-level fixed effects considerably increases the credibility of the empirical exercise, as they account for (unobserved) firm heterogeneity. However, firm-level fixed effects restrict the sample to firms with variation in the export choice among the (potential) destination countries, i.e. non-exporters are excluded from the empirical analysis as their behaviour is perfectly predicted by the respective fixed firm effect. Restricting the sample to exporters therefore facilitates the comparison of regression results including fixed firm effects to the results of model specifications when firm dummies are excluded. (iii) It is quite common in empirical articles investigating firms' export behaviour to restrict the sample to exporting firms (as done, for example, by HILLER, 2013; KOENIG, 2009; or KOENIG et al., 2010). Restricting the sample to exporters is therefore in line with related work in the field. However, including both exporters and non-exporters hardly affects the estimated export elasticities (see Appendix B).

3.3 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 ($X_{frd} > 0$). The linear relationship can be stated as follows:

$$\ln X_{frd} = \rho + \varphi \ln IMM_{rd} + \boldsymbol{\Omega}_{rd}\boldsymbol{\phi} + \boldsymbol{\Gamma}_{r}\boldsymbol{\omega} + \boldsymbol{\Psi}_{d}\boldsymbol{\pi} + \boldsymbol{\Upsilon}_{f}\boldsymbol{\nu} + \eta_f + \mu_d + \epsilon_{frd} \quad \text{if} \quad X_{frd} > 0 \qquad (4)$$

The variables included in equation (4) are the same as in the regression estimating the export propensity (see equation (3) above). The corresponding parameters are ρ, φ, $\boldsymbol{\phi}$, $\boldsymbol{\omega}$, $\boldsymbol{\pi}$ and $\boldsymbol{\nu}$. All variables except dummy and index variables are included in logarithmic terms. Due to the linear character of the model the estimated coefficients of the continuous variables can be directly interpreted as elasticities and the parameters on the dummy and index variables as semi-elasticities. The model structure with respect to including or excluding fixed firm and/or destination country effects is the same as in the probit model. When fixed firm level effects are excluded, η_f is modelled as a random individual (firm) effect with $\eta_f \sim IID\left(0, \sigma_\eta^2\right)$. ϵ_{frd} is the remainder error with $\epsilon_{frd} \sim IID\left(0, \sigma_\epsilon^2\right)$.

3.4 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:

$$\vartheta \equiv \frac{\partial P\left(X_{frd} > 0\right)}{\partial IMM_{rd}} \times \frac{IMM_{rd}}{P\left(X_{frd} > 0\right)} \approx \frac{\partial P\left(X_{frd} > 0\right)}{\partial \ln IMM_{rd}} \times \frac{1}{P\left(X_{frd} > 0\right)} \tag{5}$$

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

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 ($\zeta \approx \hat{\varphi}$). This is not the case in the probit model due to its non-linear character. Based on the regression results the marginal effect is calculated for the average firm, and the marginal effect and the estimated probability of exporting to a particular country (for the average firm) are used to calculate the extensive margin elasticity (ϑ). 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).[8]

4. Data and Econometric Issues

4.1 Data and Expected Results

The main data source is a survey conducted among 8,299 firms located in Austria (3,001 firms), the Czech Republic (1,500), Slovakia (2,298) and Hungary (1,500). The survey was carried out by telephone interviews between September and November 2010, but firms reported information on 2009.[9] The sample consists mainly of small and medium size enterprises: While the average firm has 90 employees, nearly 40% of all firms have less than ten, and 75% have less than 50 employees. In this survey firms were asked whether they make sales abroad and if so, they reported their export behaviour for a predetermined set of destination countries. The questionnaire differs between firms' home countries with respect to the set of destination countries, with the number of destinations ranging between 8 and 14 countries. The respective destination countries comprise roughly 60% of all exports from Austria and Slovakia and 75% of all exports from the Czech Republic and Hungary. The data collected within the survey include total sales and the volume of sales in each export destination. The dataset is therefore an unbalanced panel with (8,299) firms and (8 to 14) destination countries as the two dimensions (87,373 observations in total). The data set comprises information at the firm level, as the age and the size (number of employees) of the firm, information on ownership and firm structure, on the location of the firm and on the industry the firm belongs to (at the one-digit NACE level). The data set was supplemented by data on GDP, GDP per capita and on the 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.[10] Data on the home regions are from 2007 (to avoid concerns about endogeneity, see below) and on the destination countries from 2009. The distance between firms and export markets are based on the Euclidean distance between the capital of the NUTS-2 region of the firm and the capital of the destination country. Data on migration was provided by European Labour Force Survey (LFS) on a regional level (NUTS-2) from 2007. The predetermined set of possible export destinations are the source countries of more than 40% of all immigrants in Austria, and more than 80% of all immigrants in the Czech Republic, Slovakia and Hungary. Table 1 reports the number of immigrants from the set of (potential) export destination countries included in the survey[11] and reveals large differences in immigration patterns between these four Central European countries, both with respect to the absolute number of immigrants and their most important source countries. The figures in brackets of Table 1 provide information on the length of stay and denote the share of immigrants that have been residing in the respective host country for at least 10 years (by 2007). This information indicates that the majority of immigration from most countries of origin occurred previous to the last decade, suggesting that immigration is not a recent phenomenon in these countries, which enables the estimation of long-run trade effects of immigration.

< Table 1 around here >

Table 2 shows a detailed description of the variables used in the regression analysis for the entire sample (exporters and non-exporters). The export propensity is a binary variable and takes the value 1 if a firm exports to a particular destination country. 1,120 out of 8,299 firms (13.5%) export to at least one of the predetermined destination countries. On average, as each exporter makes sales in 2.3 different foreign countries, therefore 2,575 observations out of more than 87,000 firm-destination pairs (2.9%) report export activities. The numbers of observations on the volume and on the share of sales drop to 1,056, as only exporting firms are included in estimating the intensive margin and as firms are more reluctant in reporting their sales.[12] To estimate the volume of sales the absolute export volume (in million Euros, denoted as 'Sales') and, in the sensitivity analysis (reported in Appendix B), the relative export volume (share of sales in a particular destination country over total sales) are used. The export value of firms exporting to a particular country averages 2.2 million Euros.

< Table 2 around here >

To account for the distance between home and destination country, measures of geographical and cultural distance are included: Geographical distance is approximated by the (airline) distance between the capital of the NUTS-2 region (where the firm is located) and the capital of the destination country and by a dummy variable indicating if both countries share a common border. As an indication for cultural proximity a dummy variable whether both countries speak the same or a similar language[13] is included.[14]

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 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.

4.2 Econometric and Methodological 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, identifying the effect of migration on the export behaviour due to changes in the stock of immigrants over time is infeasible. 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 immigrants 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, the region and the destination specific effect. In one model specification, firm and destination-industry fixed effects are included into the regression equation. Therefore, the identification of the effect of migrants on the export decision of firms comes from deviations of the variable IMM_{rd} from region and destination averages. Excluding either firm or 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. The results of the models are, however, rather robust with respect to including or excluding different types of fixed effects.[15]

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 behaviour 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, or KOENIG et al., 2010), which is not possible using cross-sectional data. Therefore, all firm specific variables are left out of the regression equations.[16]

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 expected to be very small, as the migration variable is calculated on a regional level. Additionally, the migration variable is lagged by two years and comes 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 all region specific variables (GDP, GDP per capita and population density) are also lagged by two years. Besides, there is no indication that immigration from one source country affects exports to other countries.[17]

It is likely that there are omitted variables, like agglomeration, that influence both immigration and export behaviour. MELITZ and OTTAVIANO (2008) show in a theoretical model that agglomeration (bigger markets) leads to (on average) larger and more productive firms. Marshallian externalities can also explain 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, on the other hand, find that more agglomerated regions (with respect to population and economic activities) are preferred destinations by new immigrants (see, e.g., NOWOTNY and PENNERSTORFER, 2011). Agglomeration is controlled for by including the population density of the region where the firm is located as well as GDP per capita of that region as proxy variables (both variables lagged by two years). In some model specifications firm specific fixed effects are included to control for other region specific omitted variables.

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, (17) destination countries or – as the variable on migration – between (321) combinations of home regions and destination countries. As described by MOULTON (1990) this might lead to standard errors that are biased downwards. This issue is addressed by clustering the residuals with respect to each combination of home region and destination country in the probit models (estimating the export probability) and by using heteroscedasticity consistent estimates of the covariance matrix (WHITE, 1980) in the least squares models (estimating export volumes).[18]

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 non-random, the analysis corrects for the potentially biasing non-random sample selection using a HECKMAN (1976) type two-stage procedure. The model proposed by CHANEY (2008) suggests that variables influencing fixed, but not variable export costs affect the selection into export markets while having no effect on export volumes. We follow HELPMAN et al. (2008), MANOVE (2013) and CHRISTEN et al. (2014) who argue that variables indicating the hurdles of starting a business in both home and destination country are likely to be correlated with fixed trade costs only and are therefore well-suited to identify the first stage selection equation in the HECKMAN (1976) type two-stage procedure. As the results suggest that the self-selection of firms into export market does not affect the results on export volumes, these results are

reported in Appendix B only (see also Appendix B for a more comprehensive discussion on this issue).

The selection of firms and the selection of destination countries included in the survey is non-random: The data sample is stratified with respect to industry and home region (see endnote 9) and firms had to report their export behaviour to (a predefined set of) the most important trading partners of the home country only. Industry effects are controlled for by including respective dummy variables in each regression. In some models fixed firm effects are considered. Including this type of fixed effects 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. Interacting the variable on immigration with dummy variables for destination countries does not show structural differences of the impact of migrants on firms' export behaviour with respect to geographical or economic characteristics of the destination countries (these results are reported in Appendix C).

Last, firms report their export behaviour for 2009, a year characterized by a sharp economic downturn: The reduction in GDP (in real terms) in the countries under investigation was between –4.0% (Czech Republic) and –6.0% (Slovakia) and exports plunged between –16.9% (Slovakia) and –20.3% (Austria). The development was in line with the entire EU, where GDP dropped by –5.8% and exports by –16.6%. While the economic downturn affected firms' export behaviour it is assumed that the impact of the European business cycle is – as all other explanatory variables – additively separable in the log-linear form of the trade equation. The effect on export volumes is therefore captured by the constant, leaving the estimated coefficients unaltered. If some regions, industries or destination countries are hit especially hard by the economic crisis, the effects on firms' export activities are captured by the region- and destination specific economic variables and by the respective dummy variables.

5. Results

5.1 Extensive Margin Elasticity

The results of the probit models estimating the probability of exporting to a particular country are summarized in Table 3. Note that the sample is restricted to 1,120 firms exporting to at least one country (11,933 observations). The analysis finds 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 PROP [1] includes dummy variables for industries, PROP [2] fixed firm effects, model PROP [3] dummy variables for destination-industry combinations and PROP [4] for both firms and destination-industry. Different types of fixed effects control for various unobserved variables, but also for parts of the variation of the immigration variable necessary for identifying its influence on the export

propensity. Identification therefore comes from the variation of the number of immigrants between different destinations countries (model [2]) or between different regions (model [3]). In specification [4] identification comes from deviations of the migration variable from the region and the destination mean only. Destination (region) specific variables drop out of the equation when including destination (firm) fixed effects due to multicollinearity. Irrespective of the model specification the coefficient for immigration is positive and statistically significant at the one percent significance level. The parameter estimates are rather stable and vary between 0.217 and 0.339. The corresponding elasticities on the variable on immigration are also reported in Table 4 (in squared brackets). Following KOENIG et al. (2010) and BERMAN and HÉRICOURT (2010) the impact on the probability of a firm to export is denoted as the extensive margin of trade.[19] The extensive margin elasticities of immigration take values between 0.300 and 0.538. A comprehensive table on the marginal effects and the elasticities of all variables are reported in Table A1 in Appendix A.

< Table 3 around here >

The parameter estimates on the airline distance between the region, where the firms are located, and the capital of the destination countries take the expected negative signs and are significantly different from zero at the five percent significance level as long as destination fixed effects are not included (PROP [B1] and PROP [B2]), but are not significantly different from zero otherwise. The poor explanatory power of the geographical distance when destination country heterogeneity is controlled for by respective fixed effects might 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 centres of a country are far away from the capital (e.g. Germany). Contrary, the dummy variables indicating geographical ('Border') and cultural proximity ('Language') give very convincing results: The parameter estimates on the dummy variables whether home and destination country share a common border or speak the same language take a positive sign and are significantly different from zero at the five percent significance level in all model specifications, as expected.

The effect of home region's characteristics on firms' export propensities is somewhat contradictory: A larger GDP is associated with a lower export propensity, suggesting that firms located in larger home markets seem to have less need to expand business abroad. On the other hand, a higher GDP per capita is associated with higher export activities. The results do not provide evidence that firms located in more agglomerated regions ('Population density region') are more export oriented (due to higher productivity levels due to agglomeration advantages). Surprisingly, whether the trading partner is (also) a member of the European Union (EU) is not associated with a significantly higher export propensity.[20] 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, as expected.

5.2 Intensive Margin Elasticity

The parameter estimates for the intensive margins are summarized in Table 4. The table reports 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 above). As the endogenous variable and all explanatory variables (except binary and index variables) are included in logarithmic values the parameter estimates can be interpreted as elasticities directly.[21]

The parameter estimates of immigration on the export volume take values between 0.059 and 0.083 but are significantly different from zero at the five (ten) percent level in one (three) model(s) out of four specifications only.[22] Comparing the intensive margin elasticity to the extensive margin elasticity shows a much smaller effect on the export volume than on the export propensity.

Sharing a common border with the destination country is associated with higher export volumes (of exporting firms) of 20% to 39%. The respective parameter estimates are significantly different from zero in three model specifications. The parameter estimates on the other variables indicating geographical or cultural distance, namely the variables on airline distance and the dummy variable on language similarity, are not statistically different from zero at the five percent significance level in any model specification. The variables describing the size and the agglomeration of the home region have no significant 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 of the export market by one percent increases the export volume of exporting firms by roughly 0.15%. The influence of GDP per capita is not significantly different from zero.

< Table 4 around here >

I conclude that the influence of the share of immigrants on the export volume is much smaller than on the export propensity. While the respective parameter estimates take the expected positive sign in all model specifications, the parameters are significantly different from zero at the five (ten) percent level only once (thrice). The results reported in specification [2] and [4] are most convincing as they control for firm heterogeneity (due to including firm-level fixed effects), suggesting that there is indeed a positive effect of immigration on firms' export volumes which is, however, much smaller than its effect on the export propensity.

5.3 Sensitivity Analysis

To strengthen the confidence in the main findings this section discusses the results of alternative model specifications, while the results of the sensitivity analysis (and a more comprehensive discussion) are summarized in Appendix B and C. First, a HECKMAN (1976) type two-stage procedure is used to correct for a potentially biasing non-random sample selection, including variables indicating the hurdles to start a business in home and destination country as proxies for fixed trade costs. Although using these variables is a well-established procedure for identifying the selection into export

markets (see, e.g., HELPMAN et al., 2008, or MANOVE, 2013) and although these variables indeed have a significant effect on the export propensity, the results on export volumes are hardly affected, suggesting that self-selection of firms into export markets does not lead to biased parameter estimates (see Table B2 in Appendix B). Second, a composite index measuring cultural distance constructed by KOGUT and SINGH (1988) is included in the analysis. This index is based on different dimensions of cultural distance between home and destination country developed by HOFSTEDE (1980), namely differences in power distance, individualism, masculinity/feminity, as well as uncertainty avoidance. Cultural proximity measured by this composite index does not enhance firms' export probabilities, but has a positive influence on export volumes in most specifications (see Table B3 and Table B4 in Appendix B). While cultural closeness seems to have a stronger influence on firms' export volumes than on their export propensities, including this variable hardly affects the parameter estimates on immigration. Third, alternative measures for the export volume (namely the share of sales in one export destination among total sales, see Table B5) and for the variable measuring immigration (the share of immigrants among the entire regional population, see Table B6 and Table B7) are used. These alternative model specifications again find a strong and statistically significant effect of immigration on the export probability, whereas the influence on the export volume is smaller (although positive in all models) and significantly different from zero only in some specifications. Fourth, to allow for (potentially) different effects of immigrants depending on their length of stay the immigrants are divided in a group that has been residing in the host country for at least 10 years and in more recently arrived migrants (reported in Table B8 and Table B9). In all regressions on the export propensity immigrants that have been staying in the host country for at least ten years significantly increase firms' export propensity, whereas the effect of more recently arrived immigrants is much smaller and not significantly different from zero in any model specification, confirming that it takes time for the trade enhancing effect of immigrants to evolve. In these model specifications neither group of migrants has a statistically significant impact on export volumes. Fifth, the estimated extensive margin elasticities are hardly affected if the entire sample (on both exporters and non-exporters) is used (see Table B10) compared to restricting the sample to exporting firms only. In the last sensitivity analysis reported in Appendix B Russia and Ukraine are excluded from the empirical analysis as potential export destinations, as these countries are radically different compared to all other potential destination countries included in the survey. Again, as reported in Table B11 and Table B12, the regression results are hardly affected by this modification. Further robustness checks include regressions using additional variables (firm characteristics and variables on emigration and total immigration) and interaction terms between immigration and their countries of origin, and estimates using a restricted sample by excluding firms that are located close to a region's border (as the regional stock of migrants might be a poor proxy for the number of immigrants in the vicinity for those firms). These results are reported in Appendix C. In general, the results of the sensitivity analysis confirm the main findings, both in magnitude and statistical significance.

6. Summary and Discussion

This article investigates empirically the link between exports and migration at the firm level. The variable on immigration is calculated for each source country (and potential export destination) for each NUTS-2 region. The main finding is that the number of immigrants from a particular country have a positive, statistically significant and economically meaningful effect on the export propensity of firms located in that region to the migrants' country of origin (extensive margin elasticity). The effect of immigrants on the export volume (intensive margin elasticity), despite being positive in all models, is smaller in size and statistically insignificant in some model specifications. An increase in the number of immigrants from a particular country by 10 percent boosts firms' export propensity by roughly three to five percent, but its export volumes by less than one percent. Arguments put forward above, such as language skills, knowledge about preferences in and personal ties to their home country, can explain the causal relationship between the stock of immigrants residing in the region the firm is located and the export propensity of firms, but have little impact on firms' export volumes.

What does this tell us about how immigrants affect the structure of export costs? The ratio between intensive and extensive margin elasticity is expected to lie in the interval between zero (if immigrants reduce only fixed export costs) and $(\sigma - 1)/[\gamma - (\sigma - 1)]$ (if only variable costs are influenced). The last term is expected to be 1 or 2 (see section 3). Based on the results derived in this article the ratio between the estimated intensive and extensive margin elasticity of immigrants takes values between 0.15 and 0.22. The findings that this ratio is (relatively) close to zero and that the intensive margin elasticity is statistically insignificant in some model specifications leads to the conclusion that immigrants promote export activities to their home countries mainly by reducing fixed costs of trade.

Based on the results of PERI and REQUENA-SILVENTE (2010) one can derive a ratio between intensive and extensive margin elasticity of 0.34 for their preferred model specification. Despite using regional rather than individual data this result is very similar and therefore supports the findings derived in this paper. However, the size of the elasticities is much higher when analysing these four Central European countries compared to the analysis of Spanish provinces by PERI and REQUENA-SILVENTE (2010). This is not surprising, as immigration is a relatively recent phenomenon in Spain, where the share of foreign-born among the entire population increased in the period under investigation (from 1995 to 2008) tenfold from one percent to 10 percent. Immigration to Austria, the Czech Republic, Slovakia and Hungary is not a recent phenomenon as most of the immigrants have been living in the respective countries for more than ten years (see Table 1). As the trade enhancing effect of immigration will take some time to evolve and become effective the results of this article can be interpreted as long-run trade effects of immigration (compared to medium-run effects derived by PERI and REQUENA-SILVENTE (2010)).

From an economic policy perspective, the findings on the export behaviour of firms contribute an additional aspect to political debates on migration that usually focus on issues related to labour or

housing markets. However, a better understanding on the temporal and spatial perspective is desirable. The article shows that immigrants staying for more than ten years have a larger impact on firms' export behaviour than more recently arrived immigrants. Nonetheless, a more detailed analysis how the effect evolves (and, potentially, diminishes) over time would be interesting. As with the spatial dimension it is assumed throughout the analysis that the effect of immigration on exports is limited to NUTS-2 regions. With regionally more disaggregated data one would be able to estimate the distance decay of this effect more accurately, which would clearly contribute to our understanding of the export enhancing effect of immigration. Additionally, more insights on the channels how migrants affect the export behaviour of firms are necessary for governments to improve general conditions for immigrants to secure that their skills and knowledge are utilized most efficiently: 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 immigrants from that country – simply 'in the air', as MARSHALL (1920, p. 271) puts it? HILLER (2013) provides a first step in this direction by analysing the relationship between firms' export behaviour and the ethnic composition of their employees. Combining linked employer-employee data with information on the workers' place of residence would allow researchers to also analyse commuting distances workers are willing to endure, which would also contribute to our understanding of the spatial dimension of immigrants' trade creating effect. 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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Notes

[1] Or, equivalently, an increase in the export probability of firms.

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

[3] 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 $\gamma/(\sigma - 1) \approx 2$ using data on US firms. EATON et al. (2008) find a smaller value for this ratio (around 1.5) using data on the export behaviour of French firms.

[4] PERI and REQUENA-SILVENTE (2010) are aware of this inaccuracy and discuss this issue (see p. 1437 f.). However, they state that 'it would be very interesting (but so far impossible with the Spanish data) to do the exercise decomposing the margins at the firm-product rather than transaction level'.

[5] These arguments are also supported by WHITE and TADESSE (2008), who find that the trade enhancing effect of immigrants is particularly strong for culturally very different countries.

[6] Note that Appendices A, B and C are available as supplemental material online.

[7] Note that fixed firm effects also control for regional heterogeneity.

[8] Note that the definition of the extensive margin elasticity is slightly different to CHANEY (2008): In this article the impact of a reduction in export costs on the probability of firms to export is estimated (while the firms' export volumes are not taken into account), while CHANEY (2008) defines the extensive margin as the contribution of new exporters to the aggregate export volume. The analysis in this article (implicitly) assumes that the 'marginal exporter' exports an average volume, while theory suggests that marginal exporters are characterized by the lowest productivity (among exporting firms) and (therefore) export relatively low volumes. This might cause the extensive margin to be slightly overestimated.

[9] The survey was conducted for a project investigating current and planned cross-border activities of firms located in these countries. The possibilities of firms located in the Czech Republic, Slovakia and Hungary to post workers to Austria was restricted for some industries until May 2011. The main focus of the project was to predict changes in export behaviour of firms after lifting these restrictions. The sample is stratified with respect to industry and region, as enterprises from particular industries and firms located close to the border between Austria on the one hand and the Czech Republic, Slovakia and Hungary on the other hand, were considered to be most important for this project. While the sample is stratified with respect to these two dimensions, the sample is randomly selected within each region-industry pair.

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

[11] Note that (with respect to the United Kingdom, UK) the survey asks about the export behaviour to Great Britain (rather than the UK), while information on immigration and destination country characteristics are based on UK data.

[12] Additionally to information on total sales and on the volume of sales abroad the survey includes the share of sales abroad (over total sales). Firms reporting inconsistent figures to these questions are excluded from the sample when export volumes are analyzed.

[13] 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.

[14] A composite index based on different dimensions of cultural distance between home and destination country developed by HOFSTEDE (1980) is also included. As these variables are not available for all potential export destinations the regression results including this variable are relegated to Table B3 and Table B4 in Appendix B.

[15] Note that unobserved region-destination (or firm-destination) heterogeneity cannot be controlled for by including respective fixed effects, due to the absence of time-series data. Also note that identifying long-run effects by using temporal variation of the stock of immigrants is difficult unless immigration is not a recent phenomenon and panel data for very long time periods are available.

[16] Parameter estimates on and significance levels of immigration are hardly affected when including firm characteristics to control for firm heterogeneity. Regression results including firm specific variables are summarized in Appendix C.

[17] ANDERSON and VAN WINCOOP (2003) argue that not only absolute, but also relative trade costs are important in explaining trade flows. Therefore, immigration from one country might increase relative export costs to other countries (by reducing export costs to the source country of immigration). See Appendix C for a more extensive discussion on this issue.

[18] ANGRIST and PISCHKE (2009) list the use of clustered standard errors as one solution to the Moulton problem (p. 310 ff.). The clustered estimator of the covariance matrix is consistent if the number of groups (321 in this sample) gets large. The use of clustered standard errors when estimating export volumes is, however, infeasible, as (random or fixed) firm effects are included to exploit the panel structure of the data and as one firm is not nested in the cluster variable (home region – destination country).

[19] Note that the definition of the elasticities are slightly different compared to CHANEY (2008), who defines the extensive margin elasticity as the (relative) increase in trade volume coming from additional exporters. Also note that the elasticities are not multiplied by –1 as in CHANEY (2008).

[20] Note that the group of non-EU member countries is very heterogeneous. If Russia and Ukraine – two countries that are very different compared to all other potential export destinations in the sample – are excluded, the parameter estimate on EU membership gets significantly positive. See Appendix B for details.

[21] The parameter estimates on binary and index variables are semi-elasticities.

[22] Note that the random effects model SALES [1] is rejected by the Hausman test in favour of the respective fixed effects model (specification [2]). However, the results on this specification are summarized in Table 4 to facilitate comparing intensive and extensive margin elasticities.

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Table 1: Number of immigrants (in 1,000) for each combination of home and destination country

Home Country / Destination Country	Austria		Czech Republic		Slovakia		Hungary	
Czech Republic	39.49	(87%)			16.87	(90%)	1.24	(100%)
Hungary	32.06	(72%)	n.s.		2.79	(94%)		
Slovakia	19.84	(48%)	101.26	(76%)			11.55	(84%)
Slovenia	15.27	(98%)	n.s.		n.s.		0.72	(94%)
Russia	18.07	(38%)	7.24	(25%)	n.s.		1.83	(87%)
Poland	53.85	(67%)	11.30	(96%)	1.34	(100%)	n.s.	
Germany	150.92	(63%)	6.03	(74%)	0.04	(0%)	5.14	(84%)
Italy	20.12	(75%)	1.10	(42%)	n.s.		n.s.	
Switzerland	11.54	(75%)	n.s.		n.s.		0.20	(0%)
Austria			1.08	(80%)	0.28	(100%)	2.07	(51%)
Romania	n.s.		3.59	(90%)	0.05	(100%)	76.90	(77%)
Bulgaria	n.s.		2.06	(71%)	0.31	(100%)	0.41	(83%)
Ukraine	n.s.		25.85	(60%)	3.11	(91%)	12.08	(68%)
France	n.s.		1.48	(73%)	n.s.		0.88	(81%)
United Kingdom (UK)	n.s.		0.76	(12%)	n.s.		0.58	(44%)
The Netherlands	n.s.		0.12	(0%)	n.s.		0.23	(66%)
Croatia	n.s.		n.s.		n.s.		2.82	(92%)

Notes: 'n.s.' denotes that the country is not among the potential export destination countries included in the survey. Figures in brackets denote the share of immigrants that has been living in the host country for at least 10 years.

Table 2: Summary 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	0.029		0	1
Sales	Volume of Sales (in Mio. Euro) of firm *f* in destination country *d*, if sales>0	1,056	2.168	12.879	0.000	356.250
Immigration	Number of residents in region *r* born in the destination country *d* aged 15 or older (in 1,000)	87,393	3.452	7.299	0	39.151
Geographical Distance	Euclidean distance from the regional capital of firm *f* to the capital of destination country *d* (in km)	87,393	655.308	428.802	54.843	2,112.185
Border	Takes value 1 of home country *c* and destination country *d* share a common border and 0 otherwise	87,420	0.560		0	1
Language	Takes value 1 of home country *c* and destination country *d* share a common language and 0 otherwise	87,420	0.103		0	1
GDP region	GDP of the home region *r* (in Bn. current Euros)	87,393	27.016	22.422	6.063	72.689
GDP / capita region	GDP per capita of the home region *r* (in 1,000 current Euros)	87,393	20.280	12.858	6.300	43.500
Population density region	Population density of the home region *r* (in 1,000 residents per km²)	87,393	0.801	1.428	0.056	4.030
EU	Takes value 1 if destination country *d* is (also) a member of the European Union	87,420	0.785		0	1
GDP destination	GDP of destination country *d* (in Bn. current Euros)	87,393	625.447	771.902	28.821	2374.500
GDP / capita destination	GDP per capita of destination country *d* (in 1,000 current Euros)	87,393	18.530	8.856	1.831	33.800

Note: Standard deviations on binary variables are not reported.

Table 3: Results on probit estimation on export propensity

Variable	PROP [1]		PROP [2]		PROP [3]		PROP [4]	
ln Immigration	0.217	***	0.316	***	0.218	***	0.339	***
	(0.033)		(0.038)		(0.027)		(0.028)	
	[0.300][1]		[0.493][1]		[0.302][1]		[0.538][1]	
ln Geographical Distance	-0.165	**	-0.191	**	0.047		0.084	
	(0.069)		(0.083)		(0.061)		(0.084)	
Border	0.361	***	0.364	***	0.305	***	0.295	***
	(0.099)		(0.127)		(0.087)		(0.099)	
Language	0.426	***	0.536	***	0.304	**	0.416	***
	(0.119)		(0.123)		(0.139)		(0.137)	
ln GDP region	-0.284	**			-0.296	***		
	(0.114)				(0.083)			
ln GDP / capita region	0.253	***			0.287	***		
	(0.088)				(0.075)			
ln Population density region	-0.051	*			-0.047	*		
	(0.030)				(0.026)			
EU	0.103		-0.016					
	(0.099)		(0.129)					
ln GDP destination	0.183	***	0.236	***				
	(0.037)		(0.044)					
ln GDP / capita destination	0.261	***	0.490	***				
	(0.090)		(0.106)					
constant	-2.684	**	-8.090	***	1.304		0.550	
	(1.316)		(1.124)		(1.233)		(1.019)	
Type of FE	industry		firm		destination-industry		firm destination-industry	
N	9,628		9,181		9,253		8,797	
log likelihood	-4,456.36		-3,330.19		-4,214.86		-3,062.42	

Notes: Standard errors in parentheses. Standard errors are clustered with respect to region-destination. *** (**) [*] denote the significance at the 1% (5%) [10%] level. [1]Figures in squared brackets denote the corresponding elasticity of the variable 'ln Immigration'. The respective marginal effects are computed at means.

Table 4: Results on least squares estimation on export volumes

Variable	SALES [1]	SALES [2]	SALES [3]	SALES [4]
ln Immigration	0.059 *	0.079 **	0.067	0.083 *
	(0.035)	(0.037)	(0.045)	(0.047)
ln Geographical Distance	-0.065	-0.079	0.115	0.143
	(0.085)	(0.092)	(0.099)	(0.104)
Border	0.204 *	0.246 **	0.328 **	0.385 **
	(0.116)	(0.118)	(0.157)	(0.157)
Language	0.212 *	0.100	0.160	0.034
	(0.124)	(0.129)	(0.193)	(0.200)
ln GDP region	0.249		0.164	
	(0.260)		(0.279)	
ln GDP / capita region	-0.034		-0.105	
	(0.242)		(0.266)	
ln Population density region	-0.191		-0.153	
	(0.117)		(0.126)	
EU	0.134	0.065		
	(0.118)	(0.122)		
ln GDP destination	0.142 ***	0.164 ***		
	(0.038)	(0.041)		
ln GDP / capita destination	0.150	0.197		
	(0.124)	(0.132)		
constant	-2.476	1.353	1.145	3.858 ***
	(3.610)	(1.352)	(3.911)	(0.647)
Type of FE	industry	firm	destination-industry	firm destination-industry
Hausman test statistic	33.28		41.84	
p-value	0.000		1.000	
N	1,029	1,029	1,029	1,029
R^2	0.100	0.011	0.139	0.040

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. Specification SALES [1] and SALES [3] include random firm effects. Hausman test statistics are based on non-robust standard errors of the respective model specifications.