Sanne Hiller

Does Immigrant Employment Matter for Exports? Evidence From Denmark
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Sanne Hiller†

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Abstract

Immigration impacts the economy in ample ways: it affects growth, wages and total factor productivity. This study deals with the effects of immigration on firm exports. Can firms benefit from hiring immigrants to expand their export sales? Or do immigrants who live in the firm’s region affect trade? In contrast to the existing literature, we are able to distinguish these two distinct channels. Using matched employer-employee data from Denmark for the years 1995 - 2005, we provide novel insight in the nexus between exports and immigration. We further contribute to the literature by providing first evidence on the adjustment of firms’ product portfolio in response to immigration. Our results show that firms can reap the benefits from immigration only through hiring foreigners. This implies that the trade-cost reducing intercultural knowledge embedded in foreign expatriates can only be accessed via employment. Thus, to tap the full potential of foreign labor movements for international trade, political efforts should be targeted towards labor market integration of immigrants.

Keywords: International Trade, Migration, Firm-level analysis, Matched Employer-Employee Data

JEL-Codes: F10, F22

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†sanh@asb.dk; Department of Economics, Aarhus University, Hermodsvej 22, 8230 Aabyhøj, Denmark
1 Introduction

Immigration might increase total factor productivity (Peri 2012), affect the domestic wage structure (Ottaviano and Peri 2011), boost innovation (Gauthier-Loiselle and Hunt 2010) or promote economic growth (Felbermayr et al. 2010). On top of these direct effects, immigration has also been found to lower diverse barriers to trade and thereby bolster engagement in international markets. Foreign immigrants have the potential to lower barriers to trade, as they carry relevant market-specific information, may improve contract enforcement (Rauch 2001) and help firms to discover business opportunities abroad due to their superior knowledge about their home market (Casella and Rauch 2002). This trade-migration nexus has been assessed in theoretical and empirical works, important examples include Peri and Requena (2010), Felbermayr and Jung (2009), White (2007), Combes et al. (2005), Herander and Saavedra (2005), Girma and Yu (2002), Rauch and Trindade (2002), Dunlevy and Hutchinson (1999), Head and Ries (1998) and Gould (1994).

These studies are supportive of a trade-promoting effect of immigration, which spurs a question yet unanswered: How can firms access the knowledge embedded in the foreign population? Is it enough that immigrants are present in a country to promote trade or do firms indeed have to hire foreigners in order tap their trade-cost reducing potential?

This paper contributes to the existing literature by distinguishing whether it is foreign employment in the trading firm or the presence of immigrants in the geographical surroundings of the firm that exerts a trade-cost reducing force. It adds an additional angle by distinguishing whether foreigners bolster the number of traded products or their average value. In order to address these two questions, our analysis exploits the panel structure of a matched employer-employee data set, which contains information of Danish manufacturing exports for 168 destination markets for the years between 1995 and 2005.

Our analysis disentangles how immigration affects the composition of trade within the firm and thereby acknowledges the importance of multi-product firms. The economic importance of multi-product firms is reflected in many theoretical and empirical contributions (Bernard et al. 2010a, Bernard et al. 2010b, Eckel and Neary 2010, Goldberg et al. 2010, Ottaviano

\[1^1\text{An independently conducted unpublished study by Hatzigeorgiou and Lodefalk (2011) also uses matched employer-employee data from Sweden to address the trade-migration nexus. Koenig (2009) uses French firm-level data to analyze the link between export market entry and immigration.} \]
and Thisse 2010, Nocke and Yeaple 2008, Johnson and Myatt 2003, Eaton and Schmidt 1994, Shaked and Sutton 1990, as well as Brander and Eaton 1984). The recent paper by Bernard et al. (2010a) highlights how firms adjust their product coverage at destination markets if trade costs change, and is therefore closest to our current application. The authors show - inter alia - that the within-firm composition of exports is decisively affected by variations in variable and fixed trade costs. Both, the presence of local migrant networks, and the employment of foreigners by firms has the potential to lower trade costs, and thereby to change the product scale and scope exported by multi-product firms.

Our major results are in line with both, the literature which empirically assesses the migration-trade nexus as well as the recent theoretical advances on multi-product firms: Immigration fosters trade and changes its composition. As a novel insight, we find that the employment of foreigners from a firm’s trade partner countries benefits firm-level exports, whereas the mere presence of foreigners in the firm’s region plays no trade-promoting role. Importantly, both regional migrant networks and employees with a different ethnic background encourage an adjustment of the traded product portfolio by increasing the range of traded varieties. Our results are qualitatively and quantitatively robust to several variations of the empirical specification. In particular, we account for reverse causality of foreign employment and sample selection.

Section 2 provides a theoretical motivation and a brief literature review. Section 3 presents the data. The empirical strategy is described in Section 4. Section 5 presents and discusses the results. Finally, Section 6 concludes.

2 Theoretical Motivation and Literature Review

This study relates to two different theoretical and empirical strands of literature. First, this paper links to studies analyzing the interaction between trade and international labor mobility. Secondly, it is related to the literature on multi-product firms and their export behavior.

First, a broad theoretical and empirical economic literature argues that immigration exhibits the potential to benefit trade through the reduction of barriers (Gould 1994, Head and Ries 1998). The ways how migration can potentially lower trade cost are ample (see Dunlevy and Hutchinson 1999): Immigrants may be more aware of trade opportunities with their home countries
which arise due to cost differentials, product differentiation or foreign demand and thereby they may lower information cost (compare Casella and Rauch 2002). Moreover, immigrants are able to communicate in their native tongue and to translate between the domestic and foreign language, which fosters international transactions (Melitz 2008) and lowers both variable and fixed trade costs. Also, they may grease the wheels of international commerce through the provision of trust and confidence in international transactions. Trust is particularly important if economic transactions take place across national borders, as contract enforcement is difficult to ensure across distinct jurisdictions. Here, immigrants may sanction opportunistic behavior and convey information on those failing to meet contractual obligations (Rauch 2001, Herander and Saavedra 2005).

In a nutshell, empirical evidence is supportive for a trade-creating effect of migration on trade. The estimated immigration elasticity of exports spans between 0.08% and 0.57%, whereby the majority of studies finds an elasticity around 0.1%. Most recently and at the most detailed disaggregation level available so far, Peri and Requena (2010) establish a positive effect of immigration. With few exceptions, these studies are cross-sectional (among the exceptions: Bandyopadhyay et al. 2008, Girma and Yu 2002, Peri and Requena 2010). Immigration into Denmark and its connection to Danish trade has been assessed by White (2007). Using aggregate trade data between Denmark and 170 countries spanning from 1980 to 1990, he finds a positive connection, where the immigration elasticity is estimated at 0.572% for exports. These elasticities occupy the top end of effects estimated for other countries, which makes Denmark a particularly interesting case to consider. However, due to the nature of their data, it remains unresolved whether firms can benefit from foreigners only when they hire them.

Secondly, this paper relates to recent theoretical and empirical advances on multi-product firms. This literature follows up on Melitz (2003) and incorporates the product dimension as a source of firm heterogeneity. Most recently, Bernard et al. (2010a) provide a general equilibrium model with multiple firms and destinations. Alternative roads of modeling have been taken, but they are less closely related to our analysis, because they either impose symmetry on products and firms (Ottaviano and Thisse 2010, Allanson and Montagna 2005) or allow for firms which are large relative to the market (Eckel and Neary 2010). Other important contributions include for example Nocke and Yeaple (2006), Feenstra and Ma (2008) as well as Arkolakis and Muenhler (2010).
The paper perhaps closest to our current application is Bernard et al. (2010a), as it focuses strongly on the interaction between country-, product- and firm-heterogeneity: In order to export, firms participate in a lottery entailing sunk cost, upon which firm profitability is revealed. Subsequently, firms choose among a continuum of destination markets and products. Importantly, firm profitability depends on both the firm’s intrinsic ability as well as product characteristics, which vary across products and potentially also across destination markets. The model of Bernard et al. (2010a) generate testable predictions on both selection across firms - i.e., whether firms are forced to exit the market, stay domestic or start to export - and on selection within the firm - i.e., the product range selection.

From Bernard et al. (2010a), the following theoretical predictions on the within-firm composition of exports emerge: First, if immigration or foreign employment lowers fixed trade cost, the number of products supplied by an exporting firm to a given market (subsequently called “product extensive margin”) increases, whereas the effect on the intensive product margin is unambiguously negative. Secondly, if immigration or foreign employment lower variable trade cost, the product extensive margin increases, whereas the effect on the intensive product margin is ambiguous. Thus, the theoretical prediction - albeit detailed in the various channels - is ambiguous as the overall effect.

3 Data Description

3.1 Data Sources

To assess the impact of immigration and employment of foreign expatriates on exports, we use Danish firm-level data on manufacturing firms exporting to at least one foreign market. Thus, our study does not consider the decision of firms to initially turn from a domestic firm to an exporter, but we focus on the composition of trade of exporting firms within markets. Firm-level data is provided by Statistics Denmark: Export information is destination specific. We consider product information at the 2-digit level of the CN classification. The second data source is the “Integrated Database for Labor Market Research”, a longitudinal employer-employee regis-

\footnote{Firms with negative total revenue or negative export revenue or negative import purchases as well as firms with an export revenue greater than the total revenue are excluded.}

\footnote{Our empirical strategy takes sample selection across markets into account.}
### Table 1: Summary Statistics

<table>
<thead>
<tr>
<th>Exporter Sample</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N^x = 218871)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln Exports</td>
<td>12.795</td>
<td>2.386</td>
<td>0.000</td>
<td>22.426</td>
</tr>
<tr>
<td>ln Number of Export Products</td>
<td>0.338</td>
<td>0.581</td>
<td>0.000</td>
<td>3.497</td>
</tr>
<tr>
<td>ln Average Value Per Export Product</td>
<td>12.457</td>
<td>2.234</td>
<td>0.000</td>
<td>21.678</td>
</tr>
<tr>
<td>ln Immigrant Stock</td>
<td>4.785</td>
<td>1.718</td>
<td>0.000</td>
<td>9.164</td>
</tr>
<tr>
<td>Immigrants Employed</td>
<td>0.181</td>
<td>1.358</td>
<td>0.000</td>
<td>126.000</td>
</tr>
<tr>
<td>ln Number of Employees</td>
<td>4.339</td>
<td>1.428</td>
<td>0.000</td>
<td>9.451</td>
</tr>
<tr>
<td>ln Productivity</td>
<td>12.965</td>
<td>0.468</td>
<td>6.908</td>
<td>16.922</td>
</tr>
<tr>
<td>ln Average Hourly Wage</td>
<td>5.155</td>
<td>0.192</td>
<td>2.944</td>
<td>7.722</td>
</tr>
<tr>
<td>ln Real GDP per capita</td>
<td>9.909</td>
<td>0.679</td>
<td>7.035</td>
<td>11.197</td>
</tr>
</tbody>
</table>

This Table depicts summary statistics for the sample pooled over the period from 1995 - 2005.

The third data source are business accounts (REGNSKAB), which cover the manufacturing industry from 1995 onwards. We deflate monetary values using a 2-digit industry-specific deflator.

The resulting unbalanced panel of 7143 manufacturing traders, which covers the time period from 1995 to 2005, is merged with Danish registry data. From there, we obtain the country of origin of residents in Denmark who are first generation immigrants and match them to the firm-level information.

Finally, this firm-destination data set is complemented with macroeconomic information on the country level, whereby it comprises 168 trade partners of Denmark. Excluding Bornholm and the city of Copenhagen, we consider 13 out of 15 Danish regions. The GDP per capita series originate from Heston et al. (2009).

The sample of exporters has 218,871 observations. Table 1 provides corresponding summary statistics.
3.2 The Link Between Foreign Employment and Foreign Trade

This data set is used to empirically assess the nexus between trade and migration on the firm-level. Figure 1 displays the relation between trade and the regional immigrant stock as well as between trade and foreign employment in a given region. The data has been aggregated over all countries of destination and is plotted for all years of the sample. The graph suggests that the regional immigrant stock correlates positively with exports at the regional level. Similarly, the overall value of regional exports seems to increase in the number of foreign employees in firms belonging to a given region.

This points to a potential role for migrants in promoting trade also in the small open economy Denmark in line with the theoretical reasoning from Section 2. Still, the graph remains silent over the channel of influence of immigration in two regards: First of all, do migrants promote trade only if they are employed in a firm or is there a separate role for regionally residing immigrant groups? Secondly, the mechanism of adjustment within the firm is unclear: Does migration relate systematically to the margins of trade, i.e., with the number of traded goods?

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4In 2006, Denmark has implemented an administrative reform. The former 15 regions including 270 municipalities have been replaced by five regions and 98 municipalities. We use the terms region and county interchangeably thereby always referring to the pre-reform county.
and the average value per traded good?

With respect to the composition of firm-level trade, Figure 2 provides some descriptive insight. It depicts the number of products and the average product value (in ln) which are exported by firm-country couples pooled over the entire sample. The data is grouped by foreign employment categories, such that category 0 corresponds to firm-destination couples where the firm does not employ a migrant from the destination country and category 1 indicates that a firm-destination pair is characterized by one foreign worker from a given destination. The remaining categories are defined accordingly with 2 referring to 2-10 immigrants, 3 to 10-50, 4 to 51 - 100 and 5 to more than 100 employed immigrants. The left panel depicts the extensive product margin of trade, i.e., the number of goods that a firm trades with a country of destination on average. Considering the employment categories, the number of products traded by firm-destination pairs increases in the number of employees that the firm employs from a given destination up to category 3, which corresponds to a maximum of 50 foreign employees. Afterwards, the average number of traded products starts to decrease. With respect to the product intensive margin, the right panel of Figure 2 also displays that it is on average increasing with
Table 2: Top 15 Origin Countries and Immigrant Employment

<table>
<thead>
<tr>
<th>Country</th>
<th>Immigrant Stock</th>
<th>Employed</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>With Trade</td>
<td></td>
</tr>
<tr>
<td>1  Turkey</td>
<td>23315</td>
<td>1410</td>
<td>476</td>
</tr>
<tr>
<td>2  Germany</td>
<td>19382</td>
<td>1297</td>
<td>1012</td>
</tr>
<tr>
<td>3  Bosnia</td>
<td>13104</td>
<td>204</td>
<td>93</td>
</tr>
<tr>
<td>4  Norway</td>
<td>10128</td>
<td>444</td>
<td>340</td>
</tr>
<tr>
<td>5  Lebanon</td>
<td>9498</td>
<td>122</td>
<td>32</td>
</tr>
<tr>
<td>6  Sweden</td>
<td>8765</td>
<td>507</td>
<td>356</td>
</tr>
<tr>
<td>7  Iran</td>
<td>8212</td>
<td>224</td>
<td>68</td>
</tr>
<tr>
<td>8  United Kingdom</td>
<td>7814</td>
<td>640</td>
<td>462</td>
</tr>
<tr>
<td>9  Poland</td>
<td>7753</td>
<td>551</td>
<td>348</td>
</tr>
<tr>
<td>10 Vietnam</td>
<td>7495</td>
<td>573</td>
<td>92</td>
</tr>
<tr>
<td>11 Iraq</td>
<td>6578</td>
<td>61</td>
<td>8</td>
</tr>
<tr>
<td>12 Sri Lanka</td>
<td>6109</td>
<td>685</td>
<td>28</td>
</tr>
<tr>
<td>13 Pakistan</td>
<td>4677</td>
<td>242</td>
<td>31</td>
</tr>
<tr>
<td>14 Iceland</td>
<td>4319</td>
<td>243</td>
<td>101</td>
</tr>
<tr>
<td>15 United States</td>
<td>3815</td>
<td>171</td>
<td>135</td>
</tr>
</tbody>
</table>

This table depicts the number of immigrants by country of origin for the top 15 migrant sending countries, and the number of employees in the manufacturing sector. Numbers are an average over the time period from 1995 to 2005.

the number of foreigners from the trade partner country employed in the firm. However, similarly to the pattern found for the extensive product margin, a decay can be observed: When the number of foreign employees exceeds 50, the average export value per product slightly drops. A comparison of the pattern across both margins reveals that the employment of one immigrant as compared to none seems to exert a stronger effect on the extensive margin as compared to the intensive margin, where the evolution is rather smooth in the immigrant employment category. It seems that the employment of one foreigner helps substantially to introduce a product in his country of origin, whereas he only moderately affects the value of a traded product.

3.3 Source Countries and Destination Regions of Danish Immigration

On average, the immigrant stock from a particular country amounts to 1157 residents in Denmark. However, 50% of sending countries send less than 87 migrants. On average, most immigrants come to Denmark from Turkey (23315), Germany (19328), Bosnia (13104) and Norway (10128). Table 2 summarizes the top 15 countries which send migrants to Denmark. These four sending countries account for around 73% of the total immigrant stock. They are very hetero-
Table 3: Immigration and Immigrant Employment by County

<table>
<thead>
<tr>
<th>County</th>
<th>Immigrant Stock</th>
<th>Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>With Trade</td>
</tr>
<tr>
<td>1 Copenhagen</td>
<td>42513</td>
<td>1604 990</td>
</tr>
<tr>
<td>2 Aarhus</td>
<td>27674</td>
<td>1456 817</td>
</tr>
<tr>
<td>3 Fyn</td>
<td>18365</td>
<td>646 298</td>
</tr>
<tr>
<td>4 Frederiksborg</td>
<td>17308</td>
<td>660 389</td>
</tr>
<tr>
<td>5 North Jutland</td>
<td>13770</td>
<td>505 187</td>
</tr>
<tr>
<td>6 Vejle</td>
<td>12102</td>
<td>667 311</td>
</tr>
<tr>
<td>7 South Jutland</td>
<td>11483</td>
<td>755 477</td>
</tr>
<tr>
<td>8 Roskilde</td>
<td>9062</td>
<td>316 257</td>
</tr>
<tr>
<td>9 West Zealand</td>
<td>8214</td>
<td>327 89</td>
</tr>
<tr>
<td>10 Ringkøbing</td>
<td>7754</td>
<td>697 223</td>
</tr>
<tr>
<td>11 Ribe</td>
<td>7568</td>
<td>479 311</td>
</tr>
<tr>
<td>12 Storstrøm</td>
<td>7039</td>
<td>118 63</td>
</tr>
<tr>
<td>13 Viborg</td>
<td>5203</td>
<td>456 249</td>
</tr>
</tbody>
</table>

This Table depicts the number of immigrants by county and the number of immigrant employees in the manufacturing sector by county. Copenhagen refers to Copenhagen county without Copenhagen City.

geneous, and suggest distinct migration motives ranging from refuge seeking to work related migration. Similarly, the number of immigrants employed in the Danish manufacturing sector differs considerably: 1297 Germans are employed in the manufacturing firms in our sample. Out of these, the majority, namely 1012 German foreign expatriates work in firms which trade with Germany, whereas this holds true for only 476 Turks out of 1410 employed Turks.

Table 3 shows that the immigrants spread differently across Denmark. Most of the foreign population settles in Copenhagen County (44187), followed by Aarhus County (28643), Fyn (18624), Frederiksborg (17796) and North Jutland (14451).

In a nutshell, this section has provided some descriptive evidence of the conjecture that immigration is associated with a greater engagement of firms in international trade.
4 Empirical Strategy

Theoretical considerations as outlined in Section 2 and descriptive evidence have lead to the conjecture that immigration fosters a firm’s engagement into international transactions by lowering trade costs. In order to explore this link between trade and immigration systematically, we use a linear OLS regression model given by

\[ \ln v_{ijt}^x = \beta' X_{ijt} + \phi_r + \theta_k + \eta_t + \psi_i + \xi_j + \epsilon_{ijt}, \]  

(1)

where \( v_{ijt}^x \) is a firm \( i \)'s export sales to country \( j \) at time \( t \). \( r \) indicates the Danish region and \( k \) indicates the 2-digit manufacturing industry. \( \phi_r, \theta_k, \eta_t, \xi_j \) and \( \psi_i \) are region, industry, time, country and firm fixed effects. For practical implementation, we follow Andrews et al. (2006), and use firm-country pair fixed effects and include dummy variables for industry, region and time fixed effects. \( \epsilon_{ijt}^k \) is an idiosyncratic error. \( \beta \) is a parameter vector. \( X_{ijt} \) is a set of regressors which includes our variables of interest, namely the stock of immigrants from country \( j \) residing in region \( r \) at time \( t \) and the number of immigrants from country \( j \) employed in firm \( i \) at time \( t \) originating from country \( j \). Moreover, it accounts for several confounding factors: At the firm-level, we include firm size, the average wage and labor productivity measured by value added per worker. This allows us to account for firm size and skill composition, and to approximate the firm’s ability to integrate workers with a non-Danish ethnic background and thereby the propensity to hire foreign workers. Moreover, we account for the source country characteristics by inclusion of GDP per capita.

To address how immigration affects the composition of trade, we decompose the aggregate export value into the number of traded products, \( n_{ijt}^x \), and the average value per product traded with a partner country, \( \bar{z}_{ijt}^x \). The value of an export shipment at the firm-level, \( v_{ijt}^x \), is defined as:

\[ v_{ijt}^x = n_{ijt}^x \bar{z}_{ijt}^x. \]  

(2)

Then, we can assess how the intensive and extensive product margin are affected by immigration and foreign employment.
To this end, we estimate

\[ r_{ijt} = \beta' X_{ijt} + \phi r + \theta k + \eta_i + \psi_j + \xi_{ijt} + \epsilon_{ijt}, \]  

(3)

where \( r_{ijt} = \ln \bar{z}_{ijt} \) (\( r_{ijt} = \ln n_{ijt} \)) for the intensive export product margin (extensive export product margin).

Our model measures the intensive and extensive margin without an explicit modeling the dynamics at the product margin. A recent paper by Iacavone and Javorcik (2010) considers the dynamics of product creation and destruction within firms. Our definition of the extensive product margin at the firm-country level corresponds to “net churning”, i.e., the difference between products created and destroyed within a firm.

The identification of the immigration effect on trade is subject to two major caveats: First of all, as raised by Rauch and Trindade (2002), migrant networks may approximate similar preferences across countries, and this taste similarity per se may lead to a larger amount of trade (in differentiated goods) between countries as put forward by Linder (1961). We assume that preferences are time invariant, and therefore taken into account for implicitly by inclusion of country fixed effects. A second source of endogeneity stems from the demand for foreign labor in economically dynamic and internationalized environments. Peri and Requena (2010) tackle this challenge by instrumenting the regional immigrant stock by its prediction based on historical migration levels, arguing that immigrant communities tend to agglomerate for non-economic reasons. In our case, we have the chance to observe the behavior at the firm-level, and consider the regional immigrant stock as exogenous to the firm, given that we can capture the level of immigrant employment at the firm. The employment of foreigners is a decision that a firm makes in light of its internationalization strategy. Firm which trade large volumes with a specific country may need foreign employees from this country in order to organize their business. Thus, immigrant employment can be conjectured to be endogenous due to reverse causality. Subsequently, we will use an instrumentation strategy to account for reverse causality as discussed in Section 5.3.
5 Empirical Results

5.1 Main Results

Table 4 summarizes our main results. The first three columns summarize Fixed Effects OLS estimations for total exports, the extensive product margin and the intensive product margin. The subsequent three columns display estimation results obtained from a Panel Heckman Selection Model, whereas the last three columns show Fixed Effects Instrumental Variable estimation results. Below the point estimate, we report $p$-values and base inference on a cluster-robust variance-covariance matrix. In case of the Heckman Selection Model, standard errors are bootstrapped with 499 repetitions. In the following, we discuss the FE OLS results as benchmark case, and afterwards turn to FE IV and Sample Selection results.

Immigration: We find that immigration exhibits no statistically significant positive effect on total export sales. On the contrary, the employment of immigrants in the manufacturing firm leads to an increase in export sales: The employment of one additional foreigner from a trade partner country increases exports to his country of origin by 1.2%. The channel which drives the immigration effect on trade for both regional immigration and employment is the extensive product margin. More precisely, the number of exported products increases by 0.04% in response to a 1% increase in the immigrant stock, significant at the 1% significance level. Similarly foreign expatriates matter exclusively via the extensive product margin: the employment of an additional foreigner increases the number of exported products by 0.5%.

Trade Status: We find that two-way traders have a higher level of export sales than their one-directional trading counterparts. The level difference manifests itself in both, product scale and scope, whereby for both directions of trade, the intensive margin plays the more important role.

GDP per capita: The foreign country’s GDP per capita is an important push factor for international labor mobility (Mayda 2010). Moreover, it captures market size. We find a positive association between the foreign GDP and firm-level exports (1.221%), whereby the decomposition reveals that this is largely due to an increased value per product exported (1.080) rather than a higher number of goods shipped (0.141%).

Firm Size: Unsurprisingly, firm size is positively related to export sales (0.444%), whereby it affects mostly the average value per product exported (0.395%) rather than the number of
products (0.049%).

**Firm Productivity:** Interestingly, we find that labor productivity, measured as value added per worker, increases overall export sales through both increasing the number of products exported (0.012%) as well as the average value per product (0.101%), whereby the latter channel outweighs the former in quantitative importance. The positive link between the range of exported varieties and firm productivity is in line with Bernard et al. (2010a): Firms which exhibit a higher ability can more easily overcome the fixed cost of exporting new products as they generate sufficient variable profits, even if the product exhibits lower value attributes. However, the (clearly dominating) effect on the intensive margin is theoretically ambiguous (Bernard et al. 2010a).

**Average Hourly Wage:** In order to capture other time variant factors, like the skill-composition within the firm, we include the average hourly wage. We find that it is positively linked to total export sales (0.311%). In the decomposition between product scale and scope, it is statistically significant only in the latter case with point estimates of -0.012 and 0.323, respectively.

In a nutshell, we do not find that the presence of immigrants matters for firm exports. But those foreigners who are employed in a firm lead to an economically and statistically significant increase in firm-level exports.

In order to deepen the insight on the link between trade and migration, we address two additional concerns in this subsection, namely sample selection and reverse causality concerns. So far, we have based our estimations on a potentially non-randomly selected samples, as we only observe only firms with positive export sales to (or import purchases from) a country. Indeed, using a regression-based test for sample selection as suggested by Wooldridge (1995) confirms this conjecture, as we reject the Null of no sample selection. Consequently, we implement the sample selection correction procedure as suggested in Wooldridge (1995) and summarize results in columns 4-6 of Table 4.
Table 4: Estimation Results

<table>
<thead>
<tr>
<th></th>
<th>FE OLS</th>
<th>Heckman Selection Model</th>
<th>FE IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \ln v_{it} )</td>
<td>( \ln n_{it} )</td>
<td>( \ln \bar{z}_{it} )</td>
</tr>
<tr>
<td>ln Regional Immigrant Stock (t-1)</td>
<td>0.018</td>
<td>0.040</td>
<td>-0.022</td>
</tr>
<tr>
<td></td>
<td>0.357</td>
<td>0.000</td>
<td>0.218</td>
</tr>
<tr>
<td>Foreign Expatriates Employed (t-1)</td>
<td>0.012</td>
<td>0.005</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>0.068</td>
<td>0.048</td>
<td>0.020</td>
</tr>
<tr>
<td>Two-Way Trader (t-1)</td>
<td>0.117</td>
<td>0.045</td>
<td>0.072</td>
</tr>
<tr>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>ln Real GDP per capita (t-1)</td>
<td>1.221</td>
<td>0.141</td>
<td>1.080</td>
</tr>
<tr>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>ln Number of Employees (t-1)</td>
<td>0.444</td>
<td>0.049</td>
<td>0.395</td>
</tr>
<tr>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>ln Productivity (t-1)</td>
<td>0.114</td>
<td>0.012</td>
<td>0.101</td>
</tr>
<tr>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>ln Average Hourly Wage (t-1)</td>
<td>0.311</td>
<td>-0.012</td>
<td>0.323</td>
</tr>
<tr>
<td></td>
<td>0.000</td>
<td>0.294</td>
<td>0.000</td>
</tr>
</tbody>
</table>

\( \ln v_{it} \) denotes total export sales, \( n_{it} \) the number of exported products, \( \bar{z}_{it} \) the average value per product. Instrumental Variables are the average industry immigrant employment from a given country net of the firm, and a firms overall number of foreign employees from countries other than \( j \). The variance-covariance matrix is cluster-robust, the level of clustering is the observational unit, i.e., firm-country pairs. Two-sided p-values are reported below coefficient estimates. Standard errors of the Heckman Selection Model are bootstrapped with 499 repetitions. All specifications include year-, region-, and industry fixed effects. Critical values for the Kleibergen-Paap F-test are from Stock and Yogo (2005) and amount to 19.93, 11.59, 8.75 and 7.25 for 10%, 15%, 20% and 25% maximal IV size.
Using the sample selection correction procedure as suggested by Wooldridge (1995), our main conclusion remain qualitatively unchanged. As column 4 in Table 4 reveals, total export sales remain unaffected by regional immigration, but their composition changes: In particular, an increase of the local immigrant network from a trade partner country increases the number of products exported by the firm to the country under consideration. The main change when correcting for sample selection is that the estimates turn slightly larger as compared to our benchmark results from FE OLS as reported in Table 4, columns 1 - 3. With respect to employment of foreign expatriates, our results are also comfortably stable. We find that the employment of one additional foreign expatriate increases export sales by 1.7%. This effect operates mostly through the extensive product margin: The number of exported products increases by 0.8% in response to the employment of one additional foreigner.

Thus, accounting for sample selection corroborates our previous findings. In a similar manner, we have accounted for different propensities to employ foreign workers who originate from a trade partner country by using firm fixed effects throughout all estimations. Even though one may want to argue that this procedure purges all sources of endogeneity of immigrant employment, some concerns may remain if one believes that the hiring of immigrants is a strategic measure to increase export sales by boosting either the number of traded products or their average value. In order to accommodate this concern, we use an Instrumental Variable approach to address this concern thoroughly.

We use as an instrument the average number of immigrants from a given country who are employed in other firms in the same industry together with the number of foreigners from countries different from \( j \) employed in firm \( i \). The first instrument captures the potential supply of manufacturing workers in a given industry at time \( t \). We assume that the presence of foreigners from country \( j \) in other firms of the same industry has no direct effect on the export sales between firm \( i \) and country \( j \), other than through the link via the immigrant network across firms. The number of foreigners from all other countries but \( j \) captures the firms’ willingness to employ foreign workers in general, and is thereby correlated with immigrant employment. It is arguably exogenous, as the general presence of foreigners in a company should not affect its export or import decision with respect to a particular export destination unrelated to the immigrant. Of course, this relies on the assumption that other factors like the firm’s ability to integrate foreign workers or to access knowledge embedded in the employees is time-invariant and thereby absorbed in the fixed effects.
This set of instruments performs satisfactorily. We can reject the Null of Weak Instruments according to the Kleibergen-Paap $F$-test and we cannot reject the Null of joint instrument validity on conventional significance levels on basis of the Hansen $J$-test. Based on these panel IV regression results, which are reported in Table 4, columns 7 - 9, we confirm that the presence of immigrants in the region where a firm is located exerts no statistically significant effect on the overall level of firm exports. Even though the local immigrant network increases the number of exported products, this effect is almost offset by a reduction in traded value per product. With respect to foreign employment, we find that foreign experts in the firm increase export sales. The employment of foreigners thereby increases both the number of traded products and their average value per export destination. Most strikingly, we find that the size of the effect is almost ten times the size of the FE OLS counterpart (compare Table 4, column 1): Employment of an additional foreign expatriate increases firm exports by 13.0%.

To conclude, the IV estimation confirms our previous result that both, local immigrant networks and foreign employment are important determinants of firm-level exports in the case of Denmark. It suggests that FE OLS based results are potentially a lower bound of the trade-promoting effect that immigrants exert.

In line with earlier research on the trade-migration nexus, we find that immigration indeed fosters firm-level exports. As a novel insight, however, we find that it is not the mere presence of foreigners in the surroundings of the firm, but the employment of foreign experts by the firm, which leads to an increase in export sales. This is plausible for at least two reasons. First, the cultural knowledge which greases the wheals of international commerce is readily accessible from an employee, but hard to gather if diffused throughout a local immigrant network. Secondly, as the migrant is employed in the firm, the knowledge he carries can be linked to firm-relevant expertise on production and administrative procedures in the firm, and thereby be more efficiently used. Still, we find that regional immigrant networks do indeed matter for exports by widening the product range that is exported, which is in line with Peri and Requena (2010).

In a nutshell, both foreign employment and local immigrant networks provide channels to diversify exports, and in the former case also to expand export sales.\(^5\) These results of lower **Main conclusions do not change when excluding Germany from the sample or including ‘Rule of Law’ (Kaufmann et al. 2010) as a time-variant measure for institutional quality. Full results are available from the author.**
barriers to trade may importantly boost economic growth along the lines of Frankel and Romer (1999) by giving rise to a greater level of openness.\textsuperscript{6}

6 Conclusion

This paper investigates the trade-migration nexus on the firm-level using a matched employer-employee data set for Danish firms covering the years from 1995 to 2005. We disentangle whether the inflow of foreign labor matters for trade due to intra-firm employment of immigrants or due to the presence of regional ethnic networks. In our estimations, we account for potential endogeneity of immigrant employment and for sample selection.

Our main results are robust and in line with both, the theoretical literature on multi-product firms and the one on ethnic networks. First of all, we find that foreign employees promote firm-level trade. Secondly, our results suggest that the local presence of immigrants on its own increases the number of exported products without exerting an effect on total export sales. Thus, in line with earlier work on the nexus between trade and migration, we also ascribe an important trade-promoting force to immigration - but as a novel insight, our results suggest that in order to reap these benefits, immigrants need to be employed in the firm. Then, the cultural knowledge of foreigners which exerts a trade-promoting force is accessible to the exporting firm.

The bottom line of these results is that immigration bears the potential to reduce trade costs - if foreigners are hired by firms. Thus, it strengthens the call for integration of immigrants in the labor market and reveals that hiring foreigners can equip firms with a substantial advantage on foreign markets.

\textsuperscript{6}Unreported results show that migration and foreign employment does also promote imports, thus ceteris paribus total openness would increase in response to immigration.
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