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International Trade and Labor Market Integration of Immigrants*

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Abstract

We examine if international trade improves labor market integration of immigrants in Sweden. Immigrants participate substantially less than natives in the labor market. However, trading with a foreign country is expected to increase the demand for immigrants from that country. By hiring immigrants, a firm may access foreign knowledge and networks needed to overcome information frictions in trade. Using granular longitudinal matched employer–employee data and an instrumental variable approach, we estimate the causal effects of a firm's bilateral trade on employment and wages of immigrants from that country. We find a positive, yet heterogeneous, effect of trade on immigrant employment but no effect on immigrant wages.

Keywords: Export; Import; Immigrants; Employment; Wages

JEL Classification Numbers: F16; F22; J21; J31; J61

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1 Introduction

This paper examines how international trade affects labor market integration of immigrants in Sweden. Migrants possess qualifications that can make them relatively attractive for some employers. In particular, information about their native country could be valuable for firms wanting to trade with that country. Participation in international trade typically requires substantial knowledge of foreign countries. Differences in languages, legal systems, distribution networks, preferences, and other market characteristics add up to information frictions that firms have to overcome in order to export or import (Melitz, 2003, Allen, 2014, Bernard et al., 2018). There are different ways to acquire the necessary knowledge of foreign markets, and hiring people with a background from the country in question is presumably one.

Labor market effects of immigration have been a key issue in recent political discussions. One debated aspect is the ability of immigrants to gain employment rather than to be dependent on government support. Immigrants with relatively less knowledge about the host country's institutions, culture, and networks often have difficulties finding employment, or they are restricted to jobs that are below their formal qualifications. This is particularly the case in countries with relatively strict labor market regulations, such as high minimum wages, and with generous social insurance schemes (Bratsberg et al., 2010, 2014). As a result, immigrants tend to have considerably lower labor market participation rates and wages than natives (OECD, 2017). Moreover, the labor market participation rate differs substantially between different groups of immigrants and tend to be particularly low for people from developing countries and for refugees. As an example, the employment rate of refugees in the European Union is about nine percentage points lower than for the native population (Dumont et al., 2016).

Sweden is a particularly interesting country when studying the effects of trade on labor market integration. It is not only the paragon of a small open economy – with a trade

to GDP ratio of 91 percent – but also an important host country of immigration and a country with relatively poor labor market integration and relatively strict labor market regulations. Immigrants constitute approximately a fifth of the Swedish population. Their share has almost tripled since 1970. In recent years, Sweden – accounting for two percent of the EU population – has received the second-largest numbers of asylum seekers in the EU. Meanwhile, it takes eight to ten years until half of a cohort of immigrants from a low-income country gain a foothold in the Swedish labor market (Gustafsson et al., 2017). Moreover, and as will be shown below, the employment rate for native Swedes is around 15 percentage points higher than the rate for immigrants.

In this paper, we exploit data on firms and individuals to examine how increased exports and imports at the firm level affect employment and wages of immigrants. Our analysis relies on linked longitudinal employer–employee register data for Sweden across almost two decades. More specifically, we examine information on Swedish firms and their employees in the private sector between 1997 and 2013. These data include detailed information on the characteristics of firms and individuals, such as bilateral foreign trade, gender, and education. Importantly, we have register data on the country of birth of individuals and of their parents.

We will examine the causal effect of international trade on immigrants' labor market integration by employing a Bartik-style instrumental variable approach. In the first stage, foreign countries' demand and supply of different products are related to Swedish firms' import and export portfolios, and, in a second stage, firms' exports and imports are related to labor market outcomes of immigrants.

We start by examining whether the employment of immigrants from a particular country is affected by trade with this country, and continue by examining the trade effect on wages for employed immigrants. Moreover, we will examine both the extensive margin of trade (trade with a new country), and the intensive margin (expansion of existing trade relationships). Finally, we will examine possible heterogeneous effects by dividing our sample of immigrants

by region of origin, gender, and level of education, as well as by dividing our sample of firms by skill intensities, size, and ownership. We will also look at the effect of international trade on wages and employment of second-generation immigrants. Finally, we will examine whether employment of immigrants is more important when formal trade costs and cultural distances are large.

Our results demonstrate a relatively large and robust effect of international trade on employment of immigrants. The effect on the extensive margin is particularly large. More precisely, firms starting to export to or import from a new country exhibit an increase in employment of workers born in that country by close to 200 percent. Since most firms have very few workers from a specific foreign country, this figure corresponds to hiring "half" to "a quarter" of an immigrant, on average, when the firm starts to trade with a new country. Expanding existing trade relationships, the intensive margin, also has a positive, albeit relatively small, effect on employment of immigrants: a ten percent increase in exports or imports with a foreign country increases employment of immigrants from this country with between 0.1 and 0.6 percent. However, we find no effect of increased trade on immigrants' wages. We cautiously interpret the lack of a wage effect as caused by a large pool of immigrants outside the labor force that employers can draw upon.

The effects are heterogeneous across both immigrants and firms. International trade increases employment more for men than for women, and more for European immigrants than for immigrants from more distant regions. Labor demand increases for first-generation immigrants as well as for second-generation immigrants. Interacting trade with trade barriers, we find that trade increases labor demand relatively more when trade is with countries that have high trade barriers. Finally, the employment effect is large in firms employing relatively low-skilled workers, perhaps because such firms lack the necessary competence themselves.

Our study relates and contributes to several different areas in the literature. For instance,

whereas the effect of international trade on labor market integration of immigrants has not previously been analyzed, the positive effect of migration on international trade is well established. For instance, Hiller (2013), Hatzigeorgiou and Lodefalk (2016), Andrews et al. (2017) found a positive relationship between firms' employment of immigrants and exports to the home country of the immigrants. Moreover, Bastos and Silva (2012) used historical Portuguese emigration to examine a causal effect of foreign networks on firms' exports, finding relatively large Portuguese exports to countries with a large Portuguese diaspora. Parsons and Vezina (2018) used the exogenous location of Vietnamese immigrants in the US after the Vietnam War to examine a causal effect of immigration on international trade. States with many Vietnamese immigrants experienced relatively high levels of trade with Vietnam after the lifting of the US trade embargo. Finally, Olney and Pozzoli (2020) used a random allocation of immigrants to Danish municipalities to examine firms' choice between importing and locally producing intermediate goods. They found a causal effect on imports from the immigrants' home countries, implying that immigration fosters international trade. Hence, the above studies show a positive effect of migration on international trade, presumably because knowledge of foreign conditions lowers the costs of international trade. The demand for immigrants from a specific country can therefore be expected to increase when the potential for trade with that country is increasing. Again, we will examine this issue by looking at the causal effects of increased trade on immigrants' employment and wages.

We also contribute to the literature on how firms prepare for international trade. The fixed costs of international trade can be substantial (Melitz, 2003, Bernard et al., 2018). This is one reason why firms go through various changes prior to their engagement in international trade. More specifically, previous studies have found that firms increase employment and capital stocks before starting to export (Fabling and Sanderson, 2013), to invest in new technology (Bustos, 2011), to change the occupational structure of the workforce (Davidson et al., 2017), and to recruit employees from other exporters (Mion et al., 2014, Labanca et al., 2017). We will examine if hiring immigrants is an additional way for firms to prepare

themselves for international trade.

Finally, many previous studies have examined the conditions and policies that can increase the labor market participation rate of immigrants. For instance, previous studies have found that the initial placement of refugees is important: the local availability of jobs and of jobs requiring the right qualifications has a large impact on labor market outcomes of immigrants (Trapp et al., 2018, Åslund et al., 2010, Åslund and Fredrikson, 2009, Åslund et al., 2011, Åslund and Rooth, 2007). Moreover, integration is positively affected by existing local immigrant networks (Damm, 2009) and by well-designed active labor market programs (Sarvimäki and Hämäläinen, 2016). Again, our contribution here is to look at the effect of international trade.

The rest of the paper is organized as follows. Section II describes our data and displays descriptive statistics on immigration and labor market integration in Sweden. Section III presents our empirical model and Section IV our results. Section V concludes.

2 Data and Descriptive Statistics

2.1 Data and descriptive statistics

We use granular longitudinal employer–employee data for Sweden between 1997 and 2013. The firm-level data set covers Swedish firms in the manufacturing sector with at least 20 employees and includes information on such firm characteristics as size, capital stock, value added, and ownership.[1] Moreover, we have firm-level information on exports and imports by country at the six-digit HS level product group. These data cover all trade with countries outside the EU, as well as all trade with EU for firms with annual imports or exports above a certain threshold.[2] Our instrumental variable approach requires firms to be engaged in

[1] Our restriction to manufacturing firms is due the lack of the global bilateral services trade data necessary for constructing the instruments.

[2] For intra-EU trade, we capture approximately 96% of trade. A firm's annual exports/imports with the rest of the union has to amount to SEK X million to be recorded, with X being 4.5 in the years 2009–2014;

export and import. Hence, we will follow Hummels et al. (2014) and include only firms with exports and imports, which account for roughly 80% of the firms and 95% of employment in our sample. Our final sample includes more than 130,000 firm-year observations and more than six million employee year observations. Table A1 in the Appendix describes the included variables in our sample of firms and individuals.

We also have data on all Swedish individuals, aged 15 years and older, which we can link to the firm-level data, using unique individual and firm identifiers. The data on individuals include information on gender, education, employment, and other characteristics. Most importantly for our study, we have unique and crucial information on which country both the individual and the individual's parents are born in, which enables us to examine the effect of international trade on both first- and second-generation immigrants.

In our last year of analysis, 2013, immigrants accounted for 16 percent of the Swedish population.[3] There were immigrants from 203 different countries. The 26 countries with at least one percent of the immigrants are listed in Table 1. Immigrants from Finland is the largest group, followed by Iraq and Poland. There is a relatively large heterogeneity of the major immigrant countries, with large shares among many neighboring countries but also countries in the Middle East and Africa.

Figure 1 shows the shares of employment and wages of immigrants in our firm-level sample. The employment share has increased over time: from around 12 percent in 1997, stabilizing at around 13.5 percent between 2002 and 2010, and has since increased again to about 14.5 percent in 2013. The wage share of immigrants has developed similarly but is lower than the employment share, consistent with immigrants disproportionately being employed in low-wage jobs.

2.2 and 4.5 for imports/exports, respectively, in the years 2005–2008; and 1.5 in the years 1997–2004.

[3]The share of immigrants has increased to 19.6 percent in 2019. This figure can be compared to a mean of around 12.5 percent in the 28 European Union countries, 17 percent in the US (including illegal immigrants), 21 percent in Canada, and 29 percent in Australia (EU (2019), Connor and Budiman (2019), Tabellini (2020)).

The labor market participation rate differs between natives and immigrants, as mentioned in the introduction. There is an employment gap of around 15 percentage points as seen in Figure 2, which shows the employment rate for people from 15 years of age. The employment rate for natives is relatively constant at close to 70 percent throughout the period. The employment rate for immigrants increased in the first years but later stabilizing at around 55 percent.

The employment rates also differ between individuals with different skills. We have, in Figure 2, divided our population by education, where high skill is defined as completed post-secondary education. The employment rate of high-skilled immigrants is close to 70 percent, or at about the same level as the average employment rate for native-born people. The employment rate for high-skilled natives is around 81 percent. Hence, the employment gap between natives and immigrants is lower for high-skilled people than for the population in general, but it is also clear that differences in education cannot alone explain the differences in employment rates.

The employment figures and wages differ also between different immigrant groups, as seen in Table 2. Immigrants from Europe account for more than 50 percent of the total, immigrants from Asia for around 31 percent, and Africa around 9 percent. Employment and wages for different groups of immigrants are shown as ratios with employment and wages for native Swedes. The employment rate is highest among immigrants from South America and lowest among immigrants from Africa. There is also a large difference in wages for employed individuals. The highest wages are for immigrants from North America, whose wages are four percent higher than wages for natives. Immigrants from Africa have the lowest wages: 70 percent of the average wage for natives.

3 Empirical specification

We want to examine how international trade affects employment and wages of immigrants. For employment, the following expression is estimated:

$$L_{jkt} = \beta_X X_{jkt} + \beta_M M_{jkt} + \mathbf{Z}_{jt}\boldsymbol{\beta_Z} + \mathbf{D}_{ht}\boldsymbol{\beta_{ht}} + \mathbf{D}_{jk}\boldsymbol{\beta_j} + \epsilon_{jkt} \tag{1}$$

Where j, k, and t index firms, countries, time, and all continuous variables are in logs. L_{jkt} is the number of employees in firm j at time t who were born in country k. X_{jkt} is exports from firm j to country k at time t, and M_{jkt} is imports of firm j from country k at time t. $\mathbf{Z}_{jt}$ is a vector of firm characteristics, including size (total sales), capital intensity (capital–labor ratio), skill intensity (share of employees with post-secondary education), firm age, and a dummy variable for multinational firms. $\mathbf{D}_{ht}$ represents industry-year fixed effects to control for, for instance, technology differences across industries and for heterogeneous impacts of macroeconomic shocks on industry employment; $\mathbf{D}_{jk}$ is the firm-country fixed effect that controls for unobserved time invariant firm-country characteristics; and ϵ_{jkt} is the error term.

Our estimations for wages will follow the same approach as above. The main difference is that we will estimate the wage regressions at the individual level. Our Mincer type of regression states that the log wage (W_{ijkt}) for individual i, born in country k, working in firm j, at time t, can be expressed as:

$$W_{ijkt} = \beta_X X_{jkt} + \beta_M M_{jkt} + \mathbf{Y}_{it}\boldsymbol{\beta_Y} + \mathbf{Z}_{jt}\boldsymbol{\beta_Z} + \mathbf{D}_{ht}\boldsymbol{\beta_{ht}} + \mathbf{D}_{ij}\boldsymbol{\beta_{ij}} + \epsilon_{ijkt} \tag{2}$$

where $\mathbf{Y}_{it}$ is a vector of individual characteristics such as marital status and experience, and $\mathbf{D}_{ij}$ represents job-spell fixed effects to control for worker-firm-specific capital (e.g., Abowd et al., 1999).

The effect on demand for immigrants might be larger for firms starting to trade with a new country compared to firms that expand existing trade with a country. We will therefore examine both the extensive and intensive margins of trade, where the former captures the effect of new trade and the latter captures changes in existing trade flows. New trade is defined as trade with a new country.

3.1 Instruments for trade

One methodological challenge is that export and import might be endogenous or suffer from reversed causality. There might, for instance, be reverse causality from the presence of immigrants to international trade: immigrant employees might affect the trade shares to different countries. Moreover, although we control for various firm and individual characteristics, it is still possible that some unobserved factors may affect both the employment of immigrants and exports to these countries. One such factor could, for instance, be the acquisition of Swedish firms by foreign owners. Hence, our estimates might be biased by a possible endogeneity problem arising from reverse causality or omitted variables.

We will approach the possible endogeneity problem by using an IV strategy with a Bartik-style instrument that is correlated with bilateral exports (imports) of Swedish firms but uncorrelated with the employment of immigrants and their wages. We follow the approach by Hummels et al. (2014) and construct our instrument for exports and export demand (XD), as the change in foreign countries' imports of different products combined with the share of these products in the Swedish firm's export portfolio. In other words, we will construct an instrument that captures changes in demand of different goods in different countries.

More specifically,

$$XD_{jkt} = \sum_{g=1}^{n} c_{jg} M_{gkt} \tag{3}$$

Where XD_{jkt} is export demand that firm j encounters from country k at time t, c_{jg} is the share of product g in firm j's exports, and M_{gkt} is country k's total import (excluding import from Sweden) of product g at time t. Hence, the variable XD_{jkt} captures the increased demand for products that are already in the firm's export portfolio. The variation in c_{jg} is caused by differences in firms' export portfolios, which means that firms are differently affected by changes in world demand of different goods.

The construction of our instrument for imports, MS_{jkt} or the world's import supply, follows the approach above and can be expressed as:

$$MS_{jkt} = \sum_{g=1}^{n} d_{jg} X_{gkt} \tag{4}$$

Where d_{jg} is the share of product g in firm j's imports. X_{gkt} is country k's total export (excluding export to Sweden) of product g at time t.

Again, the two instruments are firm-country specific. Variation over time and between firms is caused by different export (import) portfolios of firms and by different changes in export demand (import supply) of different products in different countries. At the same time, the changes in export (import) demand (supply) are external to Swedish firms and unlikely to be correlated with unobserved firm characteristics that may affect the firm-level labor mix.

The weights in equations 3 and 4 are endogenous to changes in firms' engagement in international trade. We approach this problem by using fixed weights from the pre-sample period. A drawback, however, is that such an approach means that the introduction of new products will decrease the power of the instruments, since this change in the export (import) portfolio will not be captured by the weights from the first year of observation (Davidson et al., 2017). We will, therefore, use weights lagged one year as an alternative specification. As will be shown below, our results are robust regarding the choice of weights.

Data on bilateral imports and exports at the product level are available from the UN Com-

trade database. The products are at an eight-digit HS level and have been aggregated to a six-digit level. Note, again, that trade with Sweden is not included when we construct our measures on imports and exports of different products in different countries.

4 Results

4.1 Main Results

In Table 3, we present our main results for the extensive margin of trade, estimating equation 1: the effect of trade with new countries on employment of immigrants. The first three columns show that OLS gives statistically significant coefficient estimates for both imports and exports. Our preferred estimations in columns 4–6 control for a possible endogeneity between immigrant employees and trade by using the instruments described above. It is also controlling for unobservable characteristics by including industry-year and firm-country fixed effects. The instruments are highly significant and have the expected signs: an increase in a country's demand increases Swedish exports to this country, and an increase in a country's supply increases Swedish imports from this country. Finally, the instruments are found to be valid, with the F-statistics allowing us to reject the null hypotheses of weak partial correlations between the instruments and the trade variables.

Moreover, we note that our IV estimates are in line with the OLS estimates, with both showing a large effect of international trade on employment of immigrants. The export variable, in particular, is however relatively unstable and changes dramatically when we also include the import variable. The reason is a high correlation between imports and exports at the extensive margin. Judging from the coefficients in column 6, export to a new country increases employment of immigrants from that country by 189 percent. The effect of import from a new country is slightly larger at 199 percent. The average number of immigrant workers from a specific country j is approximately 0.23 and 0.37 in year *t-1* for firms starting to export and import in year t. Hence, the estimated coefficients approximately correspond to

hiring between 0.5 and 0.75 immigrant workers. Looking at the other explanatory variables, we can see that large and capital-intensive firms employ more migrants, whereas low-skilled and multinational firms employ fewer.

In Table 4, we display the main results for the intensive margin of trade, estimating equation 2: whether the expansion of existing trade relationships have an effect on employment of migrants. We do find such an effect. A 10-percent increase in exports to a specific country increases employment of immigrants from that country by somewhere between 0.6 and 1 percent according to the IV estimates. Moreover, a 10-percent increase in imports from a specific country increases employment by around 1.3 percent. Hence, the effect of import is larger than the effect of export.

It is of interest from a policy perspective to understand if the increased employment of immigrants comes from an expansion of the total labor force or from replacing native workers with immigrant workers. We therefore performed a number of additional estimations to further understand the mechanism at work. The results are shown in Table A4 in the Appendix. We started by using employment of native workers as dependent variable (columns 1 and 3). We would expect a negative effect on native workers if they are replaced by immigrant workers. This is not the case: trade has a positive effect also on native workers, which is perhaps not surprising if export increases production. We then continue and examine if the growth of immigrant workers is higher than the growth of native workers by using the share of immigrant workers as a dependent variable (columns 2 and 4). Trade at the extensive margin has a positive effect on the share of immigrants, suggesting that trade with a new country raises employment of immigrant workers more than it raises employment of native workers. Trade at the intensive margin does not seem to have more of an effect on immigrants than on native workers. We continue our analysis by examining the effects of increased trade on wages. Results from individual level estimations are seen in Table 5 for the extensive margin of trade and in Table 6 for the intensive margin of trade. The first three columns display

the OLS estimates, and columns 4–6 the IV estimates. The instruments are, again, shown to be relevant and statistically significant as well as to have the expected signs.

There are no clear signs of an effect of international trade on wages. Some of the estimated coefficients are statistically significant, but the sign sometimes differs between specifications. Moreover, all of the coefficients are relatively small. For instance, the (insignificant) point estimates suggest that a 10-percent increase in exports at the extensive margin increases wages by around 0.03 percent, according to the IV estimates, and the effect of a 10-percent increase in imports is around 0.1 percent. The corresponding (insignificant) estimates for the intensive margin of trade is 0.06 percent of for export and a negative effect for import.

The results above suggest that international trade affects demand for immigrants but not immigrant wages. However, the estimates capture wage increases for migrant workers already employed by the firm. The previous estimates showed a relatively large employment effect from international trade. These new workers might, of course, increase their wages in the new firms, compared to their old wages.

One reason for a lack of a wage effect could be that there is a pool of immigrants outside of the labor force from which firms can draw upon without having to increase wages. As discussed previously, the employment rate is substantially lower for immigrants than for native-born citizens, which supports the possibility that a pool of underutilized immigrants have a tendency to put a downward pressure on wages.

4.2 Heterogeneous Effects

We continue our analysis by examining if the effect on employment differs between different types of immigrants (Tables 7– 8), countries (Tables 9– 12), and firms (Tables 13– 14). The results are relatively stable between OLS and IV, and therefore we only display the IV results below.

4.2.1 Workers

One might assume that increased trade would have a particularly positive effect on skilled immigrants, who are well suited to engage in cross-country business ventures. We therefore started by dividing immigrants according to skills, measured by level of education. There were, perhaps surprisingly, no difference between different skill groups.[4] One potential source of bias is that foreign education is self-reported by immigrants rather than reported by foreign authorities to one of the Swedish data registers.[5] We therefore turn to an alternative measure of qualifications, namely the type of occupations of the new immigrant employees. The results are presented in the first three columns of Tables 7 and 8. Here, we do find a positive effect on all three groups of occupations, both from trade at the extensive and intensive margin, and both from import and export. As expected, the effect is larger for professionals and managers than for less-qualified occupations.

We continue by examining the effect of international trade on employment of second-generation immigrants. One would expect that knowledge of foreign countries will be passed on to children of immigrants. On the one hand, therefore, it seems reasonable to expect the second-generation immigrants to have more knowledge than natives on the foreign countries but less knowledge than first-generation immigrants. On the other hand, second-generation immigrants are expected to be better integrated into the host country than their parents and this is arguably likely to promote both their employment as well as their ability to convey knowledge about foreign countries to their employers. Ultimately, it is therefore an empirical question whether or not their combination of foreign and domestic knowledge will show up in employment patterns. Column 4 in Tables 9–10 suggests that also second-generation immigrants have knowledge relevant for firm trade. Increased trade, both at the extensive and intensive margin, increase employment of second-generation immigrants. Moreover, the

[4]The results are available upon request.

[5]More exactly, immigrants self-report the highest level of education they have achieved before emigrating to Sweden. If the immigrant later is educated in Sweden, this will be registered as the immigrant's highest level of education.

estimates suggest that the employment effect of international trade is roughly as large on second- as on first-generation immigrants.

The next two columns examine the effect by gender. Some of the coefficients are not statistically significant, but the overall results suggest that employment of both immigrant men and women increases with trade, and, with one exception, the effect is slightly larger for men than for women. One possible explanation for the larger impact on immigrant men is that they are likely to have more foreign work experience. The reason is that in many countries, men tend to participate more in the labor market than do women. More foreign work experience could make immigrant men more attractive than immigrant women to firms wanting to hire immigrants to access those foreign markets. Another possible explanation, suggested in the literature, is that firms engaged in trade prefer to hire men since women are seen as being less flexible when it comes to working hours, and such flexibility is particularly important in firms engaged in cross-border trade (Bøler et al., 2018).

4.2.2 Countries

The various hurdles for trade might be expected to differ between countries (Arkolakis, 2010). For instance, it is possible that countries at a large physical or cultural distance from Sweden or countries with a relatively regulated trade regime might require greater effort and more investment for firms wanting to trade with this country. It is then possible that the employment effects are larger for trade with such countries.

Our first take on this issue is by looking at international trade with different regions in Tables 9–10. There is no sign that trade with more distant regions has a large effect. For instance, the largest employment effect is seen for trade with culturally close Europe (and not-so-culturally close South America). Moreover, trade with distant Africa and Asia has a relatively low effect on employment. It might be interesting to note that the effect is low for employment of immigrants from Africa, the region immigrants have the lowest degree of labor market integration, as seen in Table 2.

Whereas the estimations in Tables 9–10 capture a variety of time-variant cultural and socio-economic factors, our first three estimations in Table 11–12 focus more on differences in actual trade costs. Each column reports results reflecting export and import variables with country-specific variables on the ease and costs of international trade.

More specifically, our interaction variables in columns 1–3 include formal trade barriers such as tariffs, non-tariff barriers, and a top-down measure of trade costs. The first two variables are measured as an index where high figures reflect low barriers.[6] Hence, a negative coefficient on the interaction variable with "freedom to trade" and "non-tariff barriers" means that the effect of trade with countries having high barriers on employment is positive. The variable "trade costs" is constructed such that high values mean high costs of trade. Hence, a positive coefficient on the interaction variable with "trade costs" means that the effect on employment is positive.

The included variables are not all statistically significant, but the overall result is in line with our expectations: trade with countries with high trade barriers has a comparable large effect on employment of immigrants, as seen from the negative and statistically significant coefficient between export and "freedom to trade" and export and "non-tariff barriers," as well as from the positive coefficient on the interaction variable with import and "trade costs."

We continue in columns 4 and 5 by examining two aspects of informal trade costs. The first estimation examines the cultural distance between Sweden and other countries. It might be the case that the larger the cultural distance, the more important are employees with a background from the country in question. However, we do not find any support for this hypothesis as seen from the statistically insignificant coefficients on the interaction variables. The next estimation examines the role of trust. It has been shown that low levels of bilateral trust reduce international trade (Guiso et al., 2009). The need for foreign employees might be

[6]Data sources and definition of these variables are seen in Table A2 in the Appendix.

relatively large when firms trade with countries that Swedes do not trust, or with countries not trusting Swedes. Again, we do not find support for such an effect.

4.2.3 Firms

We continue in Tables 13 and 14 by examining the effect on different types of firms. Table 13 examines the effect of the extensive margin of trade and Table 14 of the intensive margin. The first two columns examine the effect on high-skilled and low-skilled firms, measured as the share of employees with post-secondary education. It might be the case that high-skilled firms already have the necessary competence to export to foreign markets and are, therefore, in less need of recruiting immigrants when foreign demand increases. The difference between the two firm types is not consistent for the intensive and extensive margin of trade and for import and export, but the overall findings suggest that the effect is positive for both groups of firms but is larger for low-skilled firms than for high-skilled ones.

The next three columns continue by examining whether the effect differs between firms of different sizes. The positive correlation between firm size and exports has been well established, both theoretically and empirically (Melitz, 2003, Bernard et al., 2018). Small firms might lack the necessary resources to export and are thus less able to respond to an increase in foreign demand. We find in most specifications a positive effect of both imports and exports on employment of immigrants in all three groups of firms, but, contrary to our expectation, the effect tends to be larger in large firms than in small firms. One explanation for this result could be the fact that larger firms already are more internationally oriented, and this is likely to influence their recruiting patterns, paying relatively more attention to foreign knowledge and experience. Another explanation could simply be that larger (and more internationalized) firms are better managed, including a superiority in identifying and attracting key personnel, and in line with evidence of exports contributing to assortative matching between employers and employees (Bloom and Van Reenen, 2010, Davidson et al., 2012).

We continue in columns 6–9 to examine if there is a difference between domestic- and foreign-owned firms, or between local firms and multinational firms.[7] One might perhaps expect that foreign firms and multinational firms already have the necessary competence for international trade, and are thus less likely to increase recruitment of immigrants when they increase exports and imports. This hypothesis does not receive empirical support. The effect is positive in most specifications for all firm types, and there is no consistent pattern of differences between firm types.

We also sorted our sample of firms by export intensities as an additional look at heterogeneous effects. In other words, the effect of international trade on employment of immigrants might differ between firms depending on how important trade is for them. However, we found no strong evidence for such a pattern: international trade affected employment in all firms, irrespective of their export intensity. The estimated coefficients for exports and imports was slightly larger for firms with high intensities, but there was no statistically significant differences between these coefficients (not shown).

We have also run all the specifications in Tables 6–10 with wages for individuals as the dependent variable. The results are not shown but available on request. All results are fragile, with the coefficients on exports and imports changing signs in different specifications and with low levels of statistical significance. Moreover, the estimates are very small in all specifications, meaning that there are no significant economic effects of international trade on immigrants' wages.

4.3 Robustness checks

4.3.1 Weights

As previously discussed, we have used weights from the pre-sample year 1997 when we constructed our instruments. The reason is to avoid a possible endogeneity problem, but the

[7] Firms with above 50 percent foreign ownership are defined as foreign. Firms with foreign affiliates are defined as multinational.

approach comes with a cost of running the risk of missing changes in firms' trade portfolios. We therefore examine how large of a problem this might be by allowing weights to change over time in column 1 of Tables 15 and 16. The estimated coefficients differ from the ones using fixed weights in our base results in Tables 3 and4. More specifically, the effect at the extensive margin of trade becomes larger, over 200 percent, and the effect at the intensive margin of trade becomes smaller. The main conclusion remains, however, that trade increases employment of immigrants.

4.3.2 Instrument

We continue our robustness estimations by using an alternative instrument: we follow Davidson et al. (2014) and use foreign tariffs as an instrument for Swedish exports and Swedish tariffs as an instrument for Swedish imports.[8] We use tariff measures at the 2-digit HS-product level, and the instruments are constructed by relating the tariffs to Swedish firms' trade portfolios.

The advantage with tariffs is that they are arguably exogenous. Foreign countries will decide on their tariff levels without considering Sweden. Moreover, Swedish import tariffs are set and common at the European Union (EU) level. Again, since Sweden is a relatively small country, it seems reasonable to assume that Swedish conditions are not important when EU import tariffs are set. One disadvantage with using tariffs as instruments is that there is less variation in tariffs compared to previously used exports and import figures. One main reason is that a very large part of Swedish trade is with other EU countries, and tariffs are zero on intra-EU trade.

Panel B-2 of Tables 15 and 16 show that tariffs work as expected as an instrument for Swedish trade. The first stage reveals statistically significant coefficients for our instruments, showing that Swedish exports increase when foreign import tariffs decrease, and that Swedish imports increase when Swedish (EU) import tariffs decrease. Column 2 in panels A of Tables 15 and

[8]Data on tariffs are downloaded from UNCTAD's TRAINS database https://trains.unctad.org/.

16 shows the results from the second stage when we use tariffs as instruments for Swedish exports and imports. As in the previous estimations, both exports and imports have a positive and statistically significant effect on the employment of immigrants. One difference with the previous results is the size of the estimated coefficients. Using tariffs as instruments result in a much smaller estimated effect from the extensive margin of trade and a much larger effect from the intensive margin of trade. Again, the tariff instrument is only working on non-EU trade and we, therefore, believe that our previously estimated effects are more accurate.

4.3.3 Dealing with zeros

There are firms with no immigrant workers from some of the countries that they trade with. This results in observations with zeros. Our main approach to this has been to add a small value before taking the log of labor demand for computational reasons and as is common in the literature (e.g., Eichengreen and Irwin, 1995, Peri and Requena-Silvente, 2010, Bratti et al., 2014). In essence, this approach mimics a semi-log Tobit estimator. As a robustness check, we employ a Poisson pseudomaximum likelihood estimator that deals with the zeros while controlling for multiple fixed effects (FE-PPML) (Correia et al., 2020). The estimates are presented in column 3 of panel A of Tables 15 and 16. Comfortingly, we note that the FE-PPML results are qualitatively identical to our base results in Tables 3 and 4 in the sense that there is a positive and statistically significant association between trade and employment of immigrants, although the magnitudes differ. Overall, the effect is around half as large as the previous estimates, while being slightly larger than the base results for the extensive margin of exports.

5 Concluding Remarks

We find international trade to facilitate labor market integration of immigrants. Hence, one policy implication of our study is that trade promotion will have a beneficial effect by improving the labor market participation of immigrants, a group that, in many countries, is vulnerable and shows lower employment rates than the native-born population. Sweden is one of these countries: the employment rate is 15 percentage points lower for immigrants than for natives and the employment rate for immigrants from developing countries is lower still.

Our results suggest that employment of immigrants is particularly large in firms starting to trade with a new country. More precisely, when firms start to trade with a new country, employment of immigrants from this country increases by close to 200 percent. Expansion of existing trade also has a positive but small effect on the employment of immigrants. We do not, however, find any effect on wages for already employed migrants.

It is worth noting that the positive effect is found for both imports and exports, for most groups of immigrant and firms, and for trade with most regions and countries. However, the magnitude of the effect differs, and we find particularly large effects for managers and professionals, for male immigrants, for firms with a relatively unskilled labor force, and in trade with countries with high trade barriers.

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Table 1: The largest immigrant countries in Sweden in 2013

	Share of immigrant population (%)
Finland	10.5
Iraq	8.4
Poland	5.1
Former Yugoslavia	4.5
Iran	4.4
Bosnia and Hercegovina	3.7
Somalia	3.5
Germany	3.2
Turkey	3.0
Denmark	2.8
Norway	2.8
Syria	2.7
Thailand	2.4
Chile	1.8
China	1.8
Lebanon	1.6
Afghanistan	1.6
Great Britain	1.5
Romania	1.5
India	1.3
USA	1.2
Russia	1.2
Eritrea	1.1
Vietnam	1.0
Hungary	1.0
Ethiopia	1.0

Source: Statistics Sweden

Figure 1:

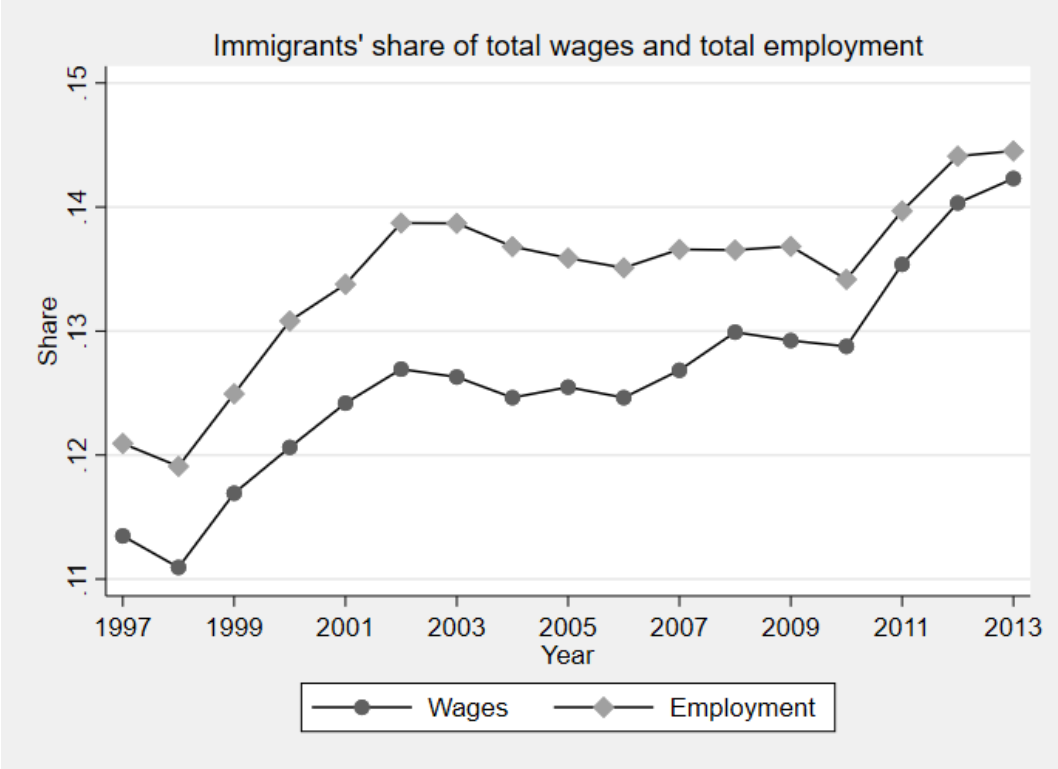
Immigrants' share of total wages and total employment
Share
.11
.12
.13
.14
.15
1997
1999
2001
2003
2005
2007
2009
2011
2013
Year
Wages
Employment

Figure 2:

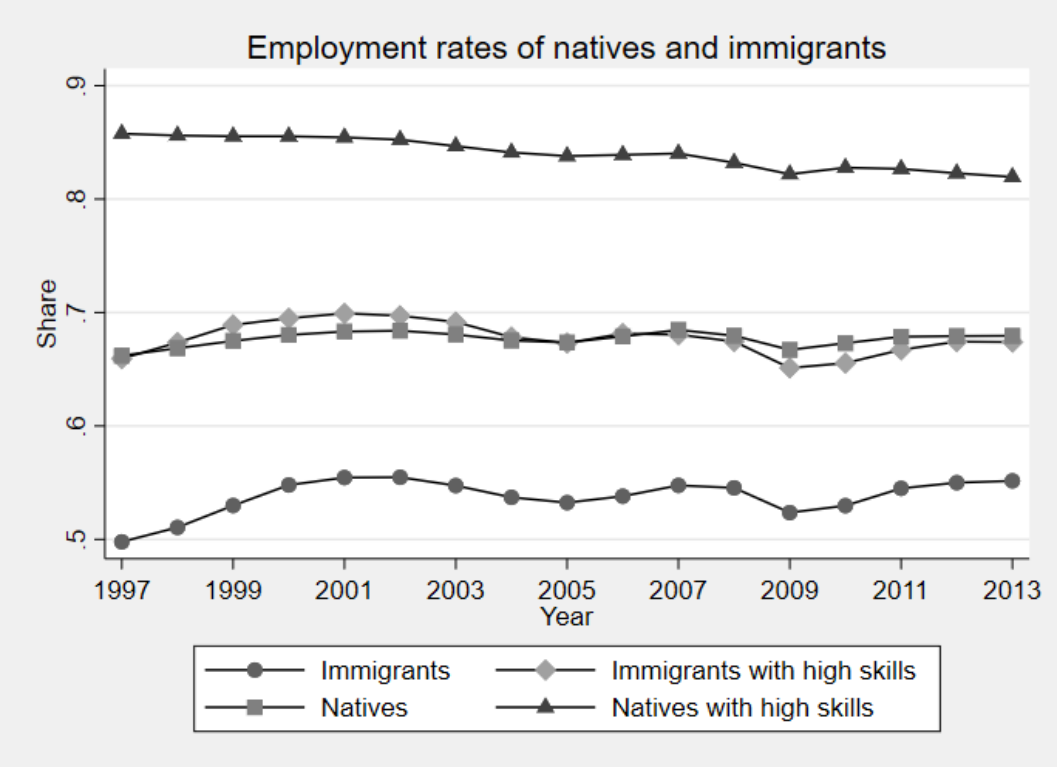

Table 2: Labor market characteristics of immigrants from different regions, 2013

Region of origin	Share of total immigrants	Employment rate	Wage rate
Europe	0.530	0.545	0.963
Asia	0.308	0.545	0.769
Africa	0.091	0.517	0.699
South America	0.045	0.699	0.847
North America	0.022	0.622	1.044

Notes: Population of foreign-born are 15 years of age. Wage rate is calculated as the average wage for employed persons from a region divided by the average wage for a native-born employed person.

Table 3: The effect of international trade on the employment of immigrants - Extensive margin

	OLS			FE-IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: second stage						
Export status (Dummy)	1.592***		0.552***	6.169***		1.888***
	(0.016)		(0.007)	(0.092)		(0.248)
Import status (Dummy)		2.858***	2.474***		2.936***	1.988***
		(0.028)	(0.025)		(0.044)	(0.121)
log(sale)	0.0616***	0.0573***	0.0513***	-0.00175	0.0117***	0.00772***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
log(physical capital stock)	0.0143***	0.0177***	0.0165***	-0.00284***	0.00336***	0.00148**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Share post-sec. edu.	0.174***	0.201***	0.129***	-0.0600***	-0.0385*	-0.0453**
	(0.015)	(0.014)	(0.014)	(0.020)	(0.020)	(0.020)
log(firm age)	-0.00245***	-0.00231***	-0.00179***	0.00255	-0.00469	-0.00251
	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.003)
Multinational status	-0.0319***	-0.0130***	-0.0281***	-0.0143***	-0.00105	-0.00500**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
log(labour productivity)	-0.0180***	-0.0141***	-0.0143***	0.000264	-0.0000512	0.0000500
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Observations	4,495,327	4,495,327	4,495,327	4,301,307	4,301,307	4,301,307
Adjusted R^2	0.108	0.195	0.203	0.729	0.728	0.729
Panel B: first stage						
			Export status (Dummy))		Import status (Dummy)	
			(1)	(2)	(3)	(4)
log (world import demand)			0.015***	0.031***		0.002***
			(0.0001)	(0.0003)		(0.0003)
log (world export supply)				-0.0002***	0.032***	0.014***
				(0.001)	(0.0001)	(0.0003)
F-statistics for instruments			2,602.67	2,512.68	2,464.49	2124.30
Observations			4,301,307	4,301,307	4,301,307	4,301,307
Adjusted R^2			0.753	0.874	0.842	0.754

Notes: Dependent variable: Log of No. of workers born in country j. Standard errors are in parentheses and clustered at firm-country level. All specifications besides OLS include industry-year and firm-country fixed effects. For the first-stage IV regression, only excluded instruments are reported in Panel B. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: The effect of international trade on the employment of immigrants - Intensive margin

	OLS			FE-IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: second stage						
log(export value)	0.385***		0.294***	0.105***		0.0654*
	(0.011)		(0.010)	(0.032)		(0.034)
log(import value)		0.417***	0.354***		0.136***	0.129***
		(0.010)	(0.010)		(0.027)	(0.028)
log(sale)	0.828***	0.854***	0.735***	0.252***	0.279***	0.268***
	(0.039)	(0.039)	(0.036)	(0.049)	(0.053)	(0.056)
log(physical capital stock)	0.140***	0.152***	0.126***	0.0608***	0.0604***	0.0572***
	(0.016)	(0.016)	(0.015)	(0.015)	(0.015)	(0.015)
Share post-sec. edu.	0.0394	0.833***	0.723***	0.292	0.440	0.443
	(0.232)	(0.233)	(0.226)	(0.542)	(0.544)	(0.549)
log(firm age)	-0.0236***	-0.0254***	-0.0255***	-0.0155	-0.0174	-0.0148
	(0.002)	(0.002)	(0.002)	(0.030)	(0.030)	(0.030)
Multinational status	-0.293***	-0.121*	-0.235***	0.0653	0.0793	0.0657
	(0.063)	(0.063)	(0.062)	(0.057)	(0.057)	(0.057)
log(labour productivity)	-0.129***	-0.116***	-0.120***	-0.00904	-0.00837	-0.00894
	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)
Observations	191,003	191,003	191,003	126,315	125,337	124,312
Adjusted R^2	0.134	0.144	0.158	0.807	0.808	0.808
Panel B: first stage						
			log(export value)		log(import value)	
			(1)	(2)	(3)	(4)
log (world import demand)			0.340***	0.335***		0.049***
			(0.007)	(0.007)		(0.006)
log (world export supply)				0.030***	0.292***	0.288***
				(0.003)	(0.005)	0.005
F-statistics for instruments			429.75	375.87	429.81	484.81
Observations			126,315	124,312	125,337	124,312
Adjusted R^2			0.802	0.842	0.757	0.758

Notes: Dependent variable: Log of No. of workers born in country j. Standard errors are in parentheses and clustered at firm-country level. All specifications besides OLS include industry-year and firm-country fixed effects. For the first-stage IV regression, only excluded instruments are reported in Panel B. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: The effect of international trade on wages of immigrants - Extensive margin

	OLS			FE-IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: second stage						
Export status (Dummy)	0.0193**		0.0096**	0.0046		0.0026
	(0.008)		(0.005)	(0.003)		(0.002)
Import status (Dummy)		0.0190**	0.0081		0.0101	0.0098
		(0.008)	(0.008)		(0.007)	(0.020)
Experience	0.115***	0.115***	0.115***	0.0105	0.0275*	0.0261*
	(0.002)	(0.002)	(0.002)	(0.038)	(0.014)	(0.014)
Experience square	-0.00167***	-0.00167***	-0.00167***	-0.00134	-0.00204***	-0.00194***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)
Married(D)	0.0554***	0.0554***	0.0554***	-0.0782*	-0.0596***	-0.0622***
	(0.007)	(0.007)	(0.007)	(0.045)	(0.020)	(0.020)
log(employment)	0.0253***	0.0253***	0.0253***	-0.186	0.223	0.146
	(0.004)	(0.004)	(0.004)	(0.880)	(0.145)	(0.119)
log(physical capital stock)	0.00609**	0.00609**	0.00609**	0.0318	0.0135	0.0140
	(0.002)	(0.002)	(0.002)	(0.049)	(0.011)	(0.012)
Share post-sec. educ.	0.442***	0.442***	0.442***	0.216	0.106	0.162
	(0.027)	(0.027)	(0.027)	(0.443)	(0.338)	(0.325)
log(firm age)	0.0132***	0.0132***	0.0132***	-0.0895	0.0453	-0.00198
	(0.000)	(0.000)	(0.000)	(0.224)	(0.082)	(0.065)
Multinational status(D)	-0.00233	-0.00233	-0.00233	0.0154	-0.000946	-0.00374
	(0.010)	(0.010)	(0.010)	(0.057)	(0.034)	(0.034)
log(labour producticity)	0.00414***	0.00414***	0.00414***	0.00203	0.00836**	0.00612**
	(0.001)	(0.001)	(0.001)	(0.011)	(0.003)	(0.003)
Observations	171,838	171,838	171,838	70,617	69,863	69,698
Adjusted R^2	0.090	0.090	0.090	0.570	0.571	0.572
Panel B: first stage						
			Export status (Dummy)		Import status (Dummy)	
			(1)	(2)	(3)	(4)
log (world import demand)			0.615***	0.560***		0.068***
			(0.012)	(0.012)		(0.011)
log (world export supply)				0.020***	0.431***	0.533***
				(0.006)	(0.013)	(0.013)
F-statistics for instruments			10.21	10.54	12.1	10.80
Observations			70,617	69,698	70,617	69,698
Adjusted R^2			0.585	0.595	0.570	0.595

Notes: Dependent variable: Log of labor income. Standard errors are in parentheses and clustered at individual-country level. All specifications besides OLS include job-spell and industry-year fixed effects. For the first-stage IV regression, only excluded instruments are reported in Panel B. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: The effect of international trade on wages of immigrants - Intensive margin

	OLS			FE-IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: second stage						
log(export value)	0.0238***		0.0142***	0.0074		0.0055
	(0.002)		(0.002)	(0.012)		(0.013)
log(import value)		0.0204***	0.0160***		-0.00341	-0.00286
		(0.001)	(0.001)		(0.007)	(0.008)
Experience	0.128***	0.128***	0.128***	0.0708***	0.0736***	0.0730***
	(0.002)	(0.002)	(0.002)	(0.013)	(0.013)	(0.013)
Experience square	-0.00192***	-0.00192***	-0.00192***	-0.00201***	-0.00202***	-0.00201***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married(D)	0.0847***	0.0891***	0.0884***	-0.0658***	-0.0695***	-0.0671***
	(0.010)	(0.010)	(0.010)	(0.017)	(0.018)	(0.018)
log(employment)	-0.0103*	-0.00193	-0.0119**	0.0617	0.0819**	0.0686
	(0.006)	(0.005)	(0.006)	(0.048)	(0.041)	(0.048)
log(physical capital stock)	0.00687**	0.00737**	0.00588*	-0.00392	-0.00244	-0.00310
	(0.003)	(0.003)	(0.003)	(0.008)	(0.008)	(0.008)
Share post-sec. educ.	0.466***	0.507***	0.498***	0.200	0.187	0.188
	(0.037)	(0.037)	(0.037)	(0.259)	(0.267)	(0.265)
log(firm age)	0.0106***	0.0108***	0.0107***	-0.00867	-0.00979	-0.00926
	(0.001)	(0.001)	(0.001)	(0.008)	(0.008)	(0.008)
Multinational status(D)	0.0265*	0.0372**	0.0322**	-0.0159	-0.0205	-0.0171
	(0.015)	(0.015)	(0.015)	(0.024)	(0.023)	(0.024)
log(labour productivity)	0.00279**	0.00285**	0.00253**	0.00335*	0.00325	0.00316
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Observations	126,910	126,910	126,910	82,478	81,669	81,476
Adjusted R^2	0.077	0.078	0.078	0.573	0.573	0.573
Panel B: first stage						
			log(export value)		log(import value)	
			(1)	(2)	(3)	(4)
log (world import demand)			0.475***	0.462***		0.054***
			(0.012)	(0.012)		(0.011)
log (world export supply)				0.018***	0.431***	0.433***
				(0.006)	(0.013)	(0.013)
F-statistics for instruments			184.42	161.59	134.56	129.71
Observations			82,478	81,476	81,669	81,476
Adjusted R^2			0.900	0.904	0.868	0.867

Notes: Dependent variable: Log of labor income. Standard errors are in parentheses and clustered at individual-country level. All specifications besides OLS include job-spell and industry-year fixed effects. For the first-stage IV regression, only excluded instruments are reported in Panel B. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Worker heterogeneity - Extensive margin

	Occupation			Second-generation immigrants	Gender	
	(1)	(2)	(3)	(4)	(5)	(6)
	Managers	Professionals	Other		Males	Females
Export status (Dummy)	0.406***	0.374***	0.127***	1.780***	0.460	0.396*
	(0.109)	(0.111)	(0.032)	(0.108)	(0.238)	(0.184)
Import status (Dummy)	0.230**	0.271***	0.100***	1.941***	0.311*	0.203
	(0.082)	(0.077)	(0.019)	(0.103)	(0.153)	(0.122)
Control variables	Included	Included	Included	Included	Included	Included
Observations	4,301,307	4,301,307	4,301,307	4,301,307	4,301,307	4,301,307
Adjusted R^2	0.647	0.648	0.976	0.973	0.805	0.789

Notes: FE-IV estimations. All specifications include industry-year and firm-country fixed effects. Dependent variable: No. of workers born in country *j*. Standard errors clustered at firm-country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Worker heterogeneity - Intensive margin

	Occupation			Second-generation immigrants	Gender	
	(1)	(2)	(3)	(4)	(5)	(6)
	Managers	Professionals	Other		Males	Females
log(export value)	0.081***	0.111***	0.025***	0.0411***	0.035	0.050
	(0.014)	(0.013)	(0.003)	(0.008)	(0.032)	(0.026)
log(import value)	0.050***	0.062***	0.017***	0.019***	0.114***	0.071***
	(0.012)	(0.010)	(0.003)	(0.007)	(0.026)	(0.022)
Control variables	Included	Included	Included	Included	Included	Included
Observations	124,311	124,311	124,311	124,311	124,311	124,311
Adjusted R^2	0.973	0.983	0.968	0.830	0.808	0.790

Notes: FE-IV estimations. All specifications include industry-year and firm-country fixed effects. Dependent variable: No. of workers born in country *j*. Standard errors clustered at firm-country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Worker heterogeneity (regions) - Extensive margin

	Africa	Asia	Europe	North America	South America
Export status (Dummy)	0.119	0.246***	0.359***	0.296***	0.436
	(0.244)	(0.087)	(0.054)	(0.086)	(0.249)
Import status (Dummy)	0.235	0.186***	0.178***	0.103	0.273*
	(0.181)	(0.063)	(0.028)	(0.054)	(0.132)
Control variables	Included	Included	Included	Included	Included
Observations	1,033,065	976,716	920,367	488,358	225,396
Adjusted R^2	0.967	0.982	0.971	0.986	0.985

Notes: FE-IV estimations. Dependent variable: Log of No. of workers born in region m. All specifications include industry-year and firm-country fixed effects. Standard errors clustered at firm-country level. * p < 0.10, ** p < 0.05, *** p < 0.01

Table 10: Worker heterogeneity (regions) - Intensive margin

	Africa	Asia	Europe	North America	South America
log(export value)	0.007*	0.033***	0.058***	0.040**	0.046
	(0.032)	(0.010)	(0.006)	(0.011)	(0.025)
log(import value)	0.004	0.033**	0.038***	0.033*	0.059
	(0.052)	(0.010)	(0.004)	(0.012)	(0.024)
Control variables	Included	Included	Included	Included	Included
Observations	1,427	16,584	89,636	10,977	1,978
Adjusted R^2	0.978	0.972	0.970	0.964	0.978

Notes: FE-IV estimations. Dependent variable: Log of No. of workers born in region m. All specifications include industry-year and firm-country fixed effects. Standard errors clustered at firm-country level. * p < 0.10, ** p < 0.05, *** p < 0.01

Table 11: Country heterogeneity (trade barriers) - Extensive margin

	Freedom to trade	Non-tariff barriers	Trade costs	Cultural distance	Communication ease
	(1)	(2)	(3)	(4)	(5)
ey/dx w.r.t Export status (Dummy)	-0.203***	-0.216***	0.132	0.308***	0.462***
	(0.068)	(0.010)	(0.084)	(0.008)	(0.101)
ey/dx w.r.t Import status (Dummy)	-0.249***	-0.483***	-0.369	-0.612***	-0.312
	(0.014)	(0.100)	(0.310)	(0.112)	(0.302)
Export status (D)*	-0.290***				
log(trade freedom)	(0.082)				
log(import value)*	0.106				
log(trade freedom)	(0.201)				
Export status (D)*		-0.132***			
log(non-tariff barriers)		(0.024)			
log(import value)*		0.102			
log(non-tariff barriers)		(0.312)			
Export status (D)*			0.119		
log(trade costs)			(0.244)		
log(import value)*			0.185***		
log(trade costs)			(0.052)		
Export status (D)*				-0.213	
log(cultural distance)				(0.282)	
log(import value)*				0.162	
log(cultural distance)				(0.266)	
Export status (D)*					0.023
log(communication ease)					(0.030)
log(import value)*					-0.034
log(communication ease)					(0.030)
Control variables	Included	Included	Included	Included	Included
Observations	3,106,310	2,765,312	3,004,342	2,910,876	3,100,206
Adjusted R^2	0.678	0.712	0.879	0.856	0.779

Notes: FE-IV estimations. The export and import variables interact with the different variables stated in the column headline. Trade freedom: index (0–100), where higher values correspond to freer trade. Non-tariff barriers: index (0–10), where higher values correspond to lower barriers. See the definitions of other trade-obstacle variables in Appendix A2. All specifications in column (1)–(3) include industry-year and firm-country fixed effects. Industry-year and firm fixed effects are included in the specifications of column (4) and column (5). Dependent variable: Log of No. of workers born in country j. Standard errors clustered at firm-country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 12: Country heterogeneity (trade barriers) - Intensive margin

	Freedom to trade	Non-tariff barriers	Trade costs	Cultural distance	Communication ease
	(1)	(2)	(3)	(4)	(5)
ey/dx w.r.t log(export value)	-0.086**	-0.168**	0.033	0.034***	0.031***
	(0.032)	(0.080)	(0.084)	(0.008)	(0.010)
ey/dx w.r.t log(import value)	-0.049	-0.176	-0.269	-0.012**	-0.024***
	(0.044)	(0.154)	(0.315)	(0.006)	(0.008)
log(export value)*	-0.028**				
log(trade freedom)	(0.010)				
log(import value)*	0.004				
log(trade freedom)	(0.011)				
log(export value)*		-0.053***			
log(non-tariff barriers)		(0.008)			
log(import value)*		0.036			
log(non-tariff barriers)		(0.046)			
log(export value)*			-0.013		
log(trade costs)			(0.030)		
log(import value)*			0.016*		
log(trade costs)			(0.005)		
log(export value)*				-0.002	
log(cultural distance)				(0.005)	
log(import value)*				0.006	
log(cultural distance)				(0.006)	
log(export value)*					0.002
log(communication ease)					(0.001)
log(import value)*					-0.002
log(communication ease)					(0.002)
Control variables	Included	Included	Included	Included	Included
Observations	80,676	79,892	80,430	111,453	89,885
Adjusted R^2	0.822	0.690	0.822	0.883	0.897

Notes: FE-IV estimations. The export and import variable are interacted with the different variables stated in the column headline. Trade freedom: index (0–100), where higher values correspond to freer trade. Non-tariff barriers: index (0–10), where higher values correspond to lower barriers. See the definitions of other trade-obstacle variables in Appendix A2. FE-IV estimations. All specifications in column (1)–(3) include industry-year and firm-country fixed effects. Industry-year and firm fixed effects are included in the specifications of column (4) and column (5). Dependent variable: Log of No. of workers born in country *j*. Standard errors clustered at firm-country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13: Firm heterogeneity - Extensive margin

	Firm skill level		Firm size			Firm ownership		Multinational status	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	High skilled	Low skilled	Small	Medium	Large	Foreign	Domestic	Multinational	Local
Export status (Dummy)	1.034	2.125***	0.671	2.689***	4.162***	0.416	0.299	1.720**	2.442**
	(0.718)	(0.263)	(0.432)	(0.317)	(0.534)	(0.466)	(0.299)	(0.293)	(0.463)
Import status (Dummy)	3.357***	1.766***	1.079***	0.954*	3.261***	1.015***	0.049	2.232***	1.238***
	(0.367)	(0.128)	(0.213)	(0.152)	(0.253)	(0.340)	(0.172)	(0.143)	(0.225)
Control variables	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	147,476	4,141,923	1,589,718	2,102,223	642,345	1,144,771	3,118,064	2,315,648	1,923,371
Adjusted R^2	0.761	0.731	0.578	0.685	0.804	0.758	0.720	0.751	0.685

Notes: FE-IV estimations. Dependent variable: Log of No. of workers born in country *j*. High-skill firms: at least 50% employees with post-secondary education. Standard errors clustered at firm-country level. All specifications include industry-year and firm-country fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 14: Firm heterogeneity - Intensive margin

	Firm skill level		Firm size			Firm ownership		Multinational status	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	High skilled	Low skilled	Small	Medium	Large	Foreign	Domestic	Multinational	Local
log(export value)	-0.072	0.055	0.040	-0.004	0.041	0.035	0.053***	0.067	-0.049
	(0.122)	(0.035)	(0.044)	(0.034)	(0.046)	(0.057)	(0.040)	(0.040)	(0.068)
log(import value)	0.019	0.111***	0.030	0.079*	0.080***	0.183***	0.090***	0.096**	0.112*
	(0.139)	(0.028)	(0.035)	(0.032)	(0.037)	(0.049)	(0.034)	(0.032)	(0.058)
Control variables	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	7,566	115,923	23,356	55,391	42,913	44,903	76,818	90,357	30,603
Adjusted R^2	0.847	0.808	0.657		0.811	0.854	0.815	0.814	0.820

Notes: FE-IV estimations. Dependent variable: Log of No. of workers born in country *j*. High-skill firms: at least 50% employees with post-secondary education. Standard errors clustered at firm-country level. All specifications include industry-year and firm-country fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 15: Robustness estimations - Extensive margin

Panel A: second stage

	Weights lagged one year	Using Tariffs as instruments	FE-PPML
	(1)	(2)	(3)
Export status (Dummy)	2.435**	1.217***	2.202***
	(0.936)	(0.121)	(0.103)
Import status (Dummy)	2.063***	0.280***	0.868***
	(0.774)	(0.081)	(0.111)
Control variables	Included	Included	
Observations	3,509,425	1,623,689	3,018,320
Adjusted R^2	0.717	0.790	
Pseudo R^2			0.902

Panel B-1: first stage

	Weights lagged one year	
	Export status (D)	Import status (D)
	(1)	(2)
log (world import demand)	0.002***	0.00002
	(0.002)	(0.0003)
log (world export supply)	0.002	0.005***
	(0.0003)	(0.0003)
F-statistics for instruments	262.84	248.02
Observations	3,509,425	3,509,425
Adjusted R^2	0.749	0.702

Panel B-2: first stage

	Using Tariffs as instruments	
	Export status (D)	Import status (D)
	(1)	(2)
log (weighted export tariff)	-0.0005***	0.0002***
	(0.0001)	(0.000)
log (weighted import tariff)	0.003***	-0.0007***
	(0.000)	(0.000)
F-statistics for instruments	20.41	32.92
Observations	3,018,320	1,623,689
Adjusted R^2	0.705	0.710

Panel B-3: first stage

	Control function	
	Export status (D)	Import status (D)
	(1)	(2)
log (world import demand)	0.003***	0.006***
	(0.000)	(0.001)
log (world export supply)	0.002***	0.001***
	(0.000)	(0.000)
Observations	3,018,320	3,018,320
Adjusted R^2	0.812	0.723

Notes: Dependent variable: Log of No. of workers born in country *j*. Standard errors are clustered at firm-country level for FE-IV and bootstrapped for FE-PPML combined with control function (rep. 50). All specifications include industry-year and firm-country fixed effects. The results of the first-stage IV regression and control function (only excluded instruments) are reported in Panel B. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 16: Robustness estimations - Intensive margin

Panel A: second stage			
	Weights lagged one year	Using Tariffs as instruments	FE-PPML
	(1)	(2)	(3)
log(export value)	0.022*	0.211*	0.032*
	(0.011)	(0.110)	(0.015)
log(import value)	0.105***	0.695***	0.068***
	(0.004)	(0.003)	(0.011)
Control variables	Included	Included	
Observations	83,501	47,204	46,283
Adjusted R^2	0.824	0.770	
Pseudo R^2			0.883

Panel B-1: first stage		
	Weights lagged one year	
	log(export value)	log(import value)
	(1)	(2)
log (world import demand)	0.184***	0.035***
	(0.007)	(0.005)
log (world export supply)	0.002	0.145***
	(0.003)	(0.005)
F-statistics for instruments	108.39	102.12
Observations	83,501	83,501
Adjusted R^2	0.825	0.775

Panel B-2: first stage		
	Using Tariffs as instruments	
	log(export value)	log(import value)
	(1)	(2)
log (weighted export tariff)	-0.017***	0.023***
	(0.005)	(0.000)
log (weighted import tariff)	0.017***	-0.027***
	(0.005)	(0.008)
F-statistics for instruments	15.82	15.15
Observations	47,204	47,204
Adjusted R^2	0.767	0.676

Panel B-3: first stage		
	Control function	
	log(export value)	log(import value)
	(1)	(2)
log (world import demand)	0.332***	0.285***
	(0.007)	(0.005)
log (world export supply)	0.010***	0.015***
	(0.003)	(0.006)
Observations	124,312	124,312
Adjusted R^2	0.805	0.760

Notes: Dependent variable: Log of No. of workers born in country j. Standard errors are clustered at firm-country level for FE-IV and bootstrapped for FE-PPML combined with control function (rep. 50). All specifications include industry-year and firm-country fixed effects. The results of the first-stage IV regression and control function (only excluded instruments) are reported in Panel B. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix

Table A1: Descriptive statistics

	Observations	Mean	SD	Min	Max
(A) Firm level data					
Sale	46,163	495,187.8	2,860,016	-85,520	1.08e+08
Employment	46,163	182.8	710.6	20	23,321
Physical capital stock	46,163	103,244.3	645,962.2	-5	2.08e+07
Share of high-skill workers	26,893	0.178	0.141	0.008	1
Firm age	34,956	16.9	6.764	1	28
Multinational status	46,163	0.532	0.499	0	1
Labour productivity	46,163	595.5	532.4	-8,909	41,489.92
(B) Firm-country level data					
Export value	316,471	2.42e+08	8.66e+08	1	2.41e+10
Import value	316,471	9.51e+07	5.46e+08	1	2.72e+10
(C) Individual level data					
Years of schooling	771,424	11.283	3.012	5	19
Age	771,424	44.717	11.491	15	89
Experience	771,414	33.434	12.626	4	84
High-skill (D)	771,424	0.374	0.484	0	1
Married(D)	771,424	0.558	0.497	0	1

Notes: All statistics are based on the data sets of the estimations. The set in panel A has firm-year observations. The set in panel B has firm-country-year observations. The set in panel C has individual-firm-country-year observations.

Table A2: Data descriptions and sources

Variables	Definitions	Sources
log (export value)	Log value of exports in millions of USD	FTS
log (import value)	Log value of imports in millions of USD	FTS
Export status (Dummy)	Exports to a specific destination, zero otherwise	FTS
Import status (Dummy)	Imports to a specific destination, zero otherwise	FTS
log (sale)	Log of sales in millions of USD	SBS
log (value added)	Log of value added in millions of USD	SBS
log (employment)	Log of number of (full-time equivalent) employees	SBS
log (productivity)	Log of value added per worker	SBS and own calculation
Share post-sec. educ.	Share of employees with any post-secondary education	LISA
log (physical capital stock)	Log of physical capital stock in millions of USD	SBS
Firm age	The number of years since the firm entered officially	FPD
log (years of schooling)	Log of the years of schooling	LISA and own calculation
Male (D)	Gender of male, zero otherwise	LISA
log (age)	Log of the person's age	LISA
Multinational status (D)	Part of an enterprise with affiliates abroad, zero otherwise	EGR
Foreign ownership (D)	Larger than 50 percent foreign ownership, zero otherwise	EGR

Notes: Sources from Statistics Sweden are Structural Business Statistics (Företagens ekonomi), SBS; Longitudinal Integration Database for Health Insurance and Labour Market Studies, LISA; Enterprise Group Register (Koncernregistret), EGR; Foreign Trade Statistics (Utrikeshandel med varor, Utrikeshandel med tjänster), FTS; Compensation of Employees and Current Transfers (Löner och transfereringar), FTS; and Business Register (Företagsdatabasen), FDB.

Table A3: Data description and sources (Continued)

Variable	Definition	Sources
Trade freedom	Index based on destination's trade-weighted average tariff, plus the incidence of non-tariff barriers to trade (0-100, where higher values correspond to freer trade)	Heritage Foundation (2014)
Non-tariff barriers	Index of trade barriers that restrict imports or exports of goods or services through mechanisms other than the simple imposition of tariffs (0–10, where higher values correspond to lower barriers)	FRASIER
Trade costs	Estimated overall bilateral costs for trade in manufactures	Arvis et al. (2013)
Cultural distance	Index of bilateral distance in terms of average differences in views along the traditional/secular-rational authority, and the survival/self-expression dimensions (0-4, where higher values correspond to culturally more distant countries) (cross-section data)	Tadesse and White (2010)
Communication ease	The probability that two random persons from two countries can have a conversation in at least some language (0,1) (cross-section data)	Melitz and Toubal (2014)

Table A4: The effect of international trade on employment of natives and on the share of immigrants

	Extensive margin		Intensive margin	
Dependent variables	log(no.of native workers)	share of immigrant workers	log(no.of native workers)	share of immigrant workers
	(1)	(2)	(3)	(4)
log(export value)	0.044***	0.001***	0.023***	-4.56e-05
	(0.007)	(0.0002)	(0.002)	(5.38e-05)
log(import value)	0.015	0.004***	0.014***	1.28e-04**
	(0.014)	(0.0005)	(0.002)	(4.58e-05)
Control variables	Included	Included	Included	Included
Observations	4,301,307	4,191,053	124,312	124,312
Adjusted R^2	0.970	0.789	0.986	0.921

Notes: FE-IV estimations. All specifications include industry-year and firm-country fixed effects. Standard errors clustered at firm-country level. * p $<$ 0.10, ** p $<$ 0.05, *** p $<$ 0.01

A5. A Note on Countries

Sweden is the reporter in our data set. Data on merchandise trade are available for 220 partner countries. Matching current trade data and migration data was complicated by the appearance of new countries, as a result of the break-ups of the Soviet Union, Yugoslavia, and Czechoslovakia.

To address these issues, the former Yugoslavia was treated as one entity, and the former Czechoslovakia was treated as another entity. One advantage of this approach is that it facilitated panel data analysis because partner countries are consistent over the years covered in the study (1998-2007). Furthermore, this approach simplifies the aggregation of trade flows.

Migrants from the former Soviet Union (USSR), which disintegrated before the period covered in our data set, were re-classified as having been born in Russia and consequently matched with Sweden's trade with Russia, since we lacked information about which parts of the USSR the immigrants came from.