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Abstract

In this paper, we investigate whether Finnish firm that exports more to Sweden also have more Swedish speaking personnel. This is interesting because English skills in both Sweden and Finland are at a very high level and trade could presumably therefore be done in English. We use a firm panel for the years 2010-2019 consisting of the entire universe of Finnish firms together with a gravity style model to accomplish our goal. We find that there is a positive relationship between firm export volumes to Sweden and the share of firm employees that are Swedish speaking, even after controlling for firm fixed effects. This is particularly true for small firms. The same does not hold for exports to China, which points to a role for languages other than English being important for trade, even in countries such as Finland and Sweden, where proficiency in English as a second language is at a very high level.

Keywords: Common language, Gravity, International trade, Sweden, Finland, China

JEL classification: C21; R11; F14

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1. Introduction

Finland and Sweden are two highly developed, small open economies that are close to the international productivity frontier. Both countries are members of the EU, which means that there are few or no trade barriers between the countries. The two countries are similar culturally (Inglehart 2006), and have a very long common history. Indeed, Finland was a part of the Kingdom of Sweden from the Middle Ages until 1809. Geographically, the countries are separated by the Baltic Sea, but in the North the countries share a border of some 550 kilometers. It is telling for the degree of integration between the countries that in the cities of Haparanda and Tornio, which are situated next to each other at the border and separated by the river Tornio, there is a golf course with 11 holes on the Swedish side and 7 holes on the Finnish side. The two countries also trade extensively with each other. In 2023, 12,8% of Finnish exports went to Sweden (International trade statistics n.d.) and 6,9% of Swedish exports went to Finland (Statistics Sweden n.d.).

Although Finnish and Swedish are not closely related linguistically Finland and Sweden are two of the countries in the world whose populations are the most proficient in English as a second language (Rubio and Lirola 2010). Thus, one would assume that trade between the two countries could be done relatively frictionlessly in English.

Still, the situation differs from the above described. Finland is officially bilingual with Swedish being the second official language (Weber and Saarela 2025). Some 5,5% of the population speaks Swedish as their first language. Using the common language Swedish-speakers would

therefore perhaps have an advantage in trade with Sweden. That is, if there indeed would exist some advantage of not trading in English only.

In this paper, we investigate at the firm level whether the share of personnel in the firm that is Swedish speaking positively affects the volume of exports to Sweden. If this is the case, it supports the notion that a common language is advantageous for trade, even in the case of trade between countries whose populations are very proficient in English and there are very few barriers to trade. As a comparison, we also investigate whether the same holds for the same firms´ exports to China. Mandarin is not related to either Finnish or Swedish and being Swedish speaking should therefore have no effect. Furthermore, as our data is at the firm level, we are able to distinguish between relationships for firms of various sizes. Indeed, it is quite possible that common language factors are more relevant for smaller firms. For instance, it has been found that small to medium-sized enterprises (SMEs)' directors' knowledge of a foreign language and international experience is positively correlated to SMEs' international diversification strategies (Fernández-Ortiz and Lombardo 2009; Tenzer, Terjesen, and Harzing 2017). It has also been noted that language aspects for smaller firms is quite an under-researched field (Tenzer, Terjesen, and Harzing 2017).

We achieve this goal by applying a gravity-type model, where firm exports to Sweden is modelled to depend on the share of employees in the firm that is Swedish speaking and where firm distance to Sweden is controlled for. It is important to take location into account, as the Swedish-speaking population in Finland is heavily concentrated in the west and south parts of the country (Saarela 2021, p. 8). The data we use comes from administrative registers in Finland. We first create a panel employer-employee data set for 2010-2019 with individual

information on the firms´ employees, including what their mother tongue is. Data on goods exports at the firm level from the Finnish Customs authorities are then linked to the data. Geographical information on firm location pertains to the latitude and longitude of center of the municipality where the firm is located. (There are over 300 municipalities in Finland). This adds an interesting North-South and East-West dimension to the analysis. It is obviously true that Sweden lies to the West of Finland, but in the North, there is a land border, whereas in the south the Baltic Sea separates the countries.

This paper resembles research on the effect of language on international trade that has been done on the country level (Egger and Lassmann 2012). But more so, this paper contributes to research regarding countries where more than one language is spoken, and there may be important regional differences within countries in international trade with other countries depending on the language used. Trade between the US and Canada is an example of this, where the French-speaking population in Canada may be at a disadvantage in trading with the US (Sauter 2012). However, things can also be the other way around, as speakers of minority languages may be able to use their language skills in order to trade more with a neighbor country with whom they share a common language (Xia and Zhou 2024). For the case of Switzerland, which has no less than four official languages, it has also been shown that spoken language is important for the source country of imports (Egger and Lassmann 2015). Thus, from the point of view of minority language rights and language learning, international trade aspects should not be overlooked, as having a minority language within the borders of a country may enhance trade. In a way, this type of argument is reminiscent of arguments found in research on immigration and trade, where it has been shown that immigration into a destination country increases trade with the country from where migrants left (e.g. Egger, von Ehrlich, and Nelson 2012).

Furthermore, while Sweden and the rest of the Nordic countries always have been important for Finnish trade, the situation has changed recently to have become even more because of geopolitical events. Finnish trade with Russia has diminished after Russia's full-scale invasion of Ukraine. Therefore, many Finnish firms are forced to look for new export markets, and Sweden and the rest Nordic countries constitute a possibility in this respect. Indeed, in 2016, the share of Finnish exports that went to Russia was 5,1% of total exports. In 2023 exports to Russia had fallen to 0,7% of total exports.

2. The gravity model and languages

The gravity model has been an important building block in international trade research for a long time (Head and Mayer 2014). The main idea in this research is that distance between countries serves as a proxy for transportation costs. The further away countries are from each other, the less they trade with each other, ceteris paribus. In the context of this paper, we would thus hypothesize that the further to the West a firm is located in Finland, the more it would trade with Sweden, ceteris paribus. Also, as there is a land border instead of the Baltic Sea separating the countries in the North, we would expect that the further North a firm is located, the more it exports to Sweden.

The above mentioned empirical gravity model research has later been amended so that the effects of language have been taken into account (Melitz and Toubal 2014). If two countries share a common language, for instance German in the case of Germany and Austria, it will have

a beneficial effect on trade. Furthermore, if related languages that may be commonly understood, for instance Danish and Norwegian, are spoken in two countries, it will also be beneficial to trade. In order to assess for how similar languages are to each other, various measures of linguistic proximity have been used (Ginsburgh and Weber 2020). Again, in the context of this paper, we would hypothesize that a firm that has a larger share of Swedish-speaking personnel should trade more with Sweden, owing to the common language Swedish.

From a theoretical point of view, there are two reasons why common languages may foster trade. First, common language obviously makes communication easier. Second, a common language or a related language may pick up cultural similarities, which may also be conducive to increased trade (Melitz 2008). In this paper however, we would argue that the cultural aspect is less important, with the two countries being close culturally (Inglehart 2006).

3. Data and empirical approach

The main data source in this paper is register data from Statistics Finland[1]. Using encrypted company and personal identifiers, it is possible to link firms to employees, thus creating an annual employer-employee data set. In this paper we have used the total universe of firms in Finland during the period 2010-2019 together with information on every employee of those firms. The employee data includes information on the mother tongue of the individual, the key variable in this paper. With this data the share of employees that are Swedish speaking has been calculated for all firms in all years. The data has then been collapsed into an annual firm panel

[1] Register data from Statistics Finland is available to researchers but requires permission and are subject to charges. See https://stat.fi/en/services/services-for-researchers for more information.

data set. The resulting data set has then been augmented with data on volumes of international trade in goods on a firm level, originating from the Finnish customs. To this panel, data on the location of the firms has been identified using coordinates to the center of the municipality where the firm operates. In this paper, we study the intensive margin of exports, i.e. we only consider exporting firms. Further, we exclude firms with less than 5 employees.

We apply the following basic empirical approach.

$$logEXP_{i,t} = SHARE_{i,t} + LOC_i + YEAR_t + TOTEXP_{i,t} + \epsilon_{i,t}.,$$

Where $SHARE_{it}$ represents the share of the Swedish speaking personnel in firm i at time t. $logEXP_{i,t}$ refers to the log of the annual volume of exports of firm i at time t. These exports are either to Sweden or China, as we estimate separate regressions for the two destination countries. To deal with the log for the many firm-years that have zero exports to Sweden, the zero has been converted to a volume of 1€ after which the log of the volume has been calculated. LOC_i is the geographical location of the firm, represented by the coordinates (latitude and longitude) of the geographical center of the municipality. Note that this obviously is not time varying and represents the distance measure used in gravity models. $YEAR_t$ is a set of annual dummies. $\epsilon_{i,t}$ is an error term. In all models, the standard errors are clustered at the firm level. However, this specification does not allow for causal interpretations for several reasons. In the next step of analysis, we therefore estimate the model using firm fixed effects. In doing so, non-observable, time-invariant firm specific effects are controlled for.

4. Results

4.1 Descriptive results

In order to highlight the differences between firm with many Swedish speakers from other firms descriptive statistics are shown with the data divided into firms that have more than 10% of its workforce being Swedish speaking, and those who have less (Table 1). First, firms that have more than 10% Swedish speakers amongst its workforce are on average located further to the west in Finland. The difference in the means of the longitude coordinate is 1.01, which corresponds to about 54 km at a latitude of 61 degrees North. Firms that have more than 10% Swedish speakers amongst its workforce is also located somewhat more to the south. The difference in the means of the latitude coordinate is 0.45, which corresponds to about 50 km at a longitude of 24 degrees.

Firms that have more than 10 % of its workforce being Swedish speaking are on average smaller. The size distribution of firms in general is also skewed towards small firms, with the median in the groups with more than 10 % Swedish speaking being 15 and the median being 22 in the other group.

In accordance with this, total exports in that group with more that 10% Swedish-speakers is also smaller. For both groups, the standard deviation of exports is very large, reflecting the fact that there are exporting firms of all firm sizes in Finland. We can also see that there is a big difference in the mean exports to Sweden and China, depending on group. Firms with more

than 10% of the workforce Swedish speaking have higher exports to Sweden, whereas the opposite is true for exports to China.

Table 1. Descriptive statistics

	> 10% of personnel Swedish-speaking	**< 10% of personnel Swedish-speaking**
Longitude	23.786	24.805
	(1.762)	(1.769)
	{24.726}	{24.978}
Latitude	60.997	61.459
	(1.338)	(1.582)
	{60.299}	{60.902}
No. of employees	51	108
	(183)	(462)
	{15}	{22}
Total exports (€/year)	3 216 648	5 674 216
	(29 933 202)	(55 456 882)
	{9209}	{29 515}
Exports to Sweden (€/year)	64 619	60 721
	(1 196 286)	(673 413)
	{0}	{0}
Exports to China (€/year)	9237	27 141
	(121 993)	(471 922)
	{0}	{0}
Share Swedish speaking (%)	36.4	1.4
	(28.3)	(2.5)
	{22.2}	{0}
No. of firm-years	9 522	44 648
No. of firms	2 827	10 845

Note: Means shown on the first row, standard deviations in parentheses. Medians are shown in curly brackets.

4.2 Regression results

The first set of results of the estimation of model 1 is presented in table 2a and 2b.

Changing the share of Swedish speaking with one percentage point (i.e from 0 to 100%) is associated with some 1.88% higher exports to Sweden (table 2a, column 1). Being further to the west in Finland is also associated with more exports to Sweden, as is a higher overall export (Table 2a). There are also differences between firm sizes, where large firms display a somewhat different pattern compared to smaller firms (Table 2a, column 5). Interestingly, the picture changes completely when analyzing the relationship between the share of Swedish-speaking of firm employees and exports to China for the same universe of Finnish firms (Table 2b, column 1). The coefficient for the share of Swedish-speaking is negative and a one percentage point increase in the share of Swedish-speaking is associated with a decrease of exports to China by 0.77%. There is also an east-west dimension, as the coefficient for longitude is negative and statistically significant for alla firms and for the smallest firms. However, the coefficient is about half the size of the equivalent one in Table 2a.

Table 2a: The relationship between firm share of Swedish speaking personnel and firm exports to Sweden.

	All	Micro	Small	Medium	Large
Share of Swe.-speaking	1.8819***	1.8831***	2.4190***	2.3633***	1.1912
	(0.2222)	(0.2579)	(0.3221)	(0.5576)	(1.1154)
Longitude	-0.1313***	-0.1253***	-0.1143***	-0.0715	0.0264
	(0.0222)	(0.0253)	(0.0310)	(0.0458)	(0.0673)
Latitude	0.0114	0.0149	0.0044	0.0327	0.2021*
	(0.0246)	(0.0352)	(0.0346)	(0.0554)	(0.0949)
Log of total exports	0.6102***	0.2511***	0.5266***	0.7546***	0.7796***
	(0.0083)	(0.0139)	(0.0112)	(0.0140)	(0.0202)
N	53 777	13 309	25 906	10 825	3737

Table 2b: The relationship between firm share of Swedish speaking personnel and firm exports to China

	All	Micro	Small	Medium	Large
Share of Swe.-speaking	-0.7741***	-0.3598*	-0.2942	-2.2381***	-3.4040*
	(0.1812)	(0.1661)	(0.2667)	(0.6321)	(1.5875)
Longitude	-0.0625**	-0.0669**	-0.0389	-0.0593	-0.1123
	(0.0203)	(0.0247)	(0.0258)	(0.0518)	(0.0872)
Latitude	-0.0127	-0.0029	-0.0306	0.0929	0.0543
	(0.0209)	(0.0242)	(0.0264)	(0.0533)	(0.0864)
Log of total exports	0.3130***	0.1678***	0.2318***	0.3699***	0.5830***
	(0.0087)	(0.0113)	(0.0096)	(0.0159)	(0.0285)
N	53 777	13 309	25 906	10 825	3737

Note: Ordinary least squares regressions. Standard errors are in parentheses and are clustered at the firm level. All regressions include a full set of year dummies. “Micro” refers to firms with 5-9 employees. “Small” refers to firms with 10-49 employees. “Medium” refers to firms with 50-249 employees. “Large” refers to firms with more than 50 employees of more.

In the next step we add firm fixed effects to our model (Tables 3a and 3b). This takes care of unobserved time-invariant firm fixed effects. This changes the results so that the share of Swedish-speaking of firm personnel now is positive and statistically significant for exports to Sweden for all firms and for the smallest firm category (Table 3a). The size of those coefficients are also considerably smaller than those of Table 2a. For the case of exports to China, we find no significant results at all for the share of Swedish-speaking firm personnel. Otherwise, the coefficients for the latitude and longitude variables are not significantly different from zero for either exports to Sweden or exports to China. This is of course to be expected, as there is very little within-firm variation in firm location. (Some firms move obviously, but that is rare.)

Table 3a: The relationship between firm share of Swedish speaking personnel and firm exports to Sweden. Fixed effects models

	All	Micro	Small	Medium	Large
Share of Swe.-speaking	1.0037**	1.4503**	0.6236	0.2183	4.9762
	(0.3702)	(0.5470)	(0.6302)	(1.5440)	(4.8594)
Longitude	-0.0041	-0.0624	-0.0156	0.0314	-0.0080
	(0.0183)	(0.1405)	(0.0368)	(0.0256)	(0.0270)
Latitude	-0.0168	-0.0534	-0.0243	-0.0184	-0.0170
	(0.0214)	(0.1162)	(0.0471)	(0.0370)	(0.0278)
Log of total exports	0.3233***	0.1810***	0.3316***	0.3854***	0.2981***
	(0.0103)	(0.0156)	(0.0143)	(0.0258)	(0.0414)
N	53 788	13 309	25 917	10 826	3 736
Number of firms	12 612	5 393	6 981	2 454	697

Table 3b: The relationship between firm share of Swedish speaking personnel and firm exports to China. Fixed effects models

	All	Micro	Small	Medium	Large
Share of Swe.-speaking	-0.4722	-0.0655	-0.3419	-0.8123	-3.7982
	(0.3084)	(0.4646)	(0.5866)	(1.3244)	(6.0539)
Longitude	-0.0271	-0.1018	-0.0283	0.0234	-0.0483
	(0.0177)	(0.0844)	(0.0373)	(0.0328)	(0.0259)
Latitude	0.0109	0.0974	0.0355	-0.0095	-0.0009
	(0.0180)	(0.0654)	(0.0412)	(0.0286)	(0.0286)
Log of total exports	0.1421***	0.1319***	0.1266***	0.1328***	0.2005***
	(0.0068)	(0.0119)	(0.0089)	(0.0154)	(0.0349)
N	53777	13309	25906	10825	3737
Number of firms	12 612	5 393	6 981	2 454	697

Note: Ordinary least squares regressions with fixed effects at the firm level. Standard errors are in parentheses and are clustered at the firm level. All regressions include a full set of year dummies. “Micro” refers to firms with 5-9 employees. “Small” refers to firms with 10-49 employees. “Medium” refers to firms with 50-249 employees. “Large” refers to firms with more than 50 employees of more

5. Discussion

In this paper we have shown that in pooled OLS and fixed-effects models, the bigger the share of Swedish-speaking personnel there is in a firm, the more it exports to Sweden, holding total firm exports constant. We find no positive relationships for having Swedish -speaking personnel for firm exports to China. This points to an effect of language. Although we cannot rule out that Swedish-speaking Finns are culturally closer to Sweden than Finnish-speaking Finns, we argue that this may not be too important, as Sweden and Finland, including the Finnish-speaking Finns, are very close culturally (Inglehart 2006). Consequently, this would argue for a role for the common language Swedish being important for trade between Finland and Sweden, despite the high level of English spoken as a foreign language in both countries.

Our results also point to differences between firm sizes regarding the common language - export relationship. In our fixed-effects models, the only group for which we found significant results were for the smallest size group. This is a result we have not encountered in this literature before. It is possible that for small firms, personal relationships between sellers and buyers are more important than for bigger firms and having a common language may therefore be more important for small firms than for larger firms.

Although we have gotten far in showing that the Swedish language is important for trade between Finland and Sweden, this paper has some weaknesses, as the precise causal

explanation has still to be uncovered[2]. Furthermore, our data are from years before the introduction of artificial intelligence (AI), and it is quite possible that AI will decrease the need for local languages in international trade in the future (Brynjolfsson, Hui, and Liu 2019).

Nevertheless, the question of the need for languages other than English for international trade is far from resolved (Ginsburgh and Weber 2020). More research is needed particularly regarding small firms and their use of local languages. This type of research also has implications for language training. For instance, is it necessary from an international trade perspective for a small country to invest in language training in languages like French and German. Or is it enough to trade in English only?

[2] In a final step we also have attempted to instrument the share of Swedish-speaking of firm personnel by the share of the population in the municipality where the firm is located. This was generally not successful in a panel instrumental variables regression setting, as the within-municipality variation in municipal demography is small. However, we also attempted to use the instrumental variable for the pooled ordinary least squares (OLS) setting for which the results were presented in Table 2a. In this analysis, our instrument was strongly associated with the share of Swedish-speaking firm personnel in the first stage regression, and the results in the second stage of the two-stages least squares regression were similar to those in Table 2a (results available upon request).

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