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International trade effects of student migration

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International trade effects of student migration

Lena Susanne Specht, University College Dublin

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International trade effects of student migration *

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March 9, 2022

Abstract

The conventional immigration and trade literature regards immigrants as mediators for informal barriers such as institutional and cultural differences. However, this notion neglects network effects stemming from short visits. This paper investigates the ways in which international student migration relates to trade. Unlike other immigrants, international students make a special case because of their short stay and high education level. Leveraging panel data on 34 mostly OECD host countries and 172 origin countries between 2000 and 2018, I employ a gravity-type trade model to examine this relationship. I find that overall immigration contributes to trade and international students particularly increase their host countries' exports to their origin country. Further results suggest that the student effect varies by country and product. While their ability to foster the most information-intensive trades is limited relative to the average immigrant, international students have an advantage in promoting trust between institutionally distant countries.

Keywords: International trade, International students, Networks, Migration, Gravity model

JEL codes: F12, F14, F22

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1 Introduction

Since Gould (1994), researchers assign immigrants an innate ability to bond countries and strengthen their trade. This is because they can bridge foreign cultures and customs which cultivate business relationships. In particular, immigration alleviates information frictions to trade which are higher if countries are culturally and institutionally different (Girma and Yu, 2002; Dunlevy, 2006). Similarly, these issues may matter more for differentiated products (Rauch and Trindade, 2002). Overall, the literature suggests that immigrants stimulate trade especially high-skilled immigration (e.g. Felbermayr and Jung (2009) and Egger et al. (2020)).

Despite this growing body of research on immigration and international trade, the literature has barely studied international students' trade outcomes. Nevertheless, there are reasons to think that international students may have a distinctly different effect from other migrants. For example, while UNESCO (2020) defines international students as individuals who cross a national border to study, other immigrants may come specifically for work. Additionally, students do not seem to stay in the host country. The OECD (2011) estimated that for several OECD countries, only between 15% to 35% of international students stayed in the host country to apply for work or other permits. This short term stay could potentially lead to different trade outcomes. Finally, an immigrant who travels for work may be more experienced than a recent graduate and thus may present a better candidate for strengthening business relations. Exceptions to this gap are Murat (2014, 2018) who shows that international student migration has trade-inducing effects. I contribute by building on her work in three key ways: using a significantly broader set of countries, comparing students to the average migrant and examining contract intensity. In particular, I find that students from non-OECD countries have a greater impact on trade than the average migrant.

Specifically, I use panel data on 34 (mostly OECD) host and 172 origin countries from 2000 to 2018, where I find that increasing the share of international students in total immigration by one percentage point is associated with a rise in exports of around 1.6%. This suggests that the way that international students induce trade and mitigate information frictions is different compared to other immigrants. This result is strongest for students from non-OECD countries where cultural barriers are

particularly high. Disaggregating into homogeneous and differentiated products, as well as contract intensities, points towards a student effect with only a limited capacity to overcome some informational barriers. These findings underline the obstacles some networks (such as students and recent graduates) face, an issue barely discussed in the existing literature.

I proceed as follows. Section 2 discusses the related literature and Section 3 sets up the econometric model and describes the data I use. Section 4 presents and discusses the results. Section 5 concludes and suggests avenues for further analysis.

2 International students' trade effects

Compared to the literature on trade effects from permanent migration, only a few examples exist that study temporary migration outcomes. These include Jansen and Piermartini (2009) for temporary immigration to the US and Startz (2016) for business travel and Nigerian trade (although neither specifically consider students). Essentially, the findings point in a similar direction as those of permanent migration and two channels are responsible for this trade effect: the immigrants' demand for their origin countries' products (preference channel) and reduced information barriers (information channel). While the preference channel affects the host countries' imports, that is the country the immigrant has moved to, the information channel can increase both imports and exports because it lowers transaction costs of trade by alleviating communicational and institutional barriers between foreign countries (Gould, 1994). While students can also affect trade via both channels since they return to their origin the preference channel would affect the origin's imports rather than exports.[1]

However, there are reasons to believe that the underlying mechanisms depend on the immigrants' connectedness to their origin country (and host country), their skill or education level and occupation. The former can be attributed to their duration of stay. Jansen and Piermartini (2009) argue that higher trade outcomes due to temporary immigration can be the result of their high knowledge on current customs

[1]Note that since students presumably have limited income while overseas, their impact on trade via the preference channel while studying is likely negligible.

in the origin country. Ironically, the fleeting nature of these immigrants' stays prevents them from gaining a deep knowledge about the host country's culture and customs. Instead, networking efficiently performed by business travel may lead to trade without requiring a lot of time (e.g. Startz (2016)). Indeed, high-skilled immigrants and those in managerial jobs are specific drivers of the trade-increasing effects of immigration (e.g. Felbermayr and Jung (2009); Egger et al. (2020); Aleksynska and Peri (2014)).

A question rarely posed is how friendships play a role in the immigrants' trade effects. That is, although the idea that trust facilitates trade dates back to Greif's (1989, 1993) studies on the Maghribi traders. If temporary immigration leads to relationships and trust between the participating parties, this should enhance their connectedness even after leaving the host country. When these immigrants are, or in the case of students currently becoming, highly skilled, this should provide an optimal precondition for bilateral trade. Thus, in contrast to other types of immigrants, international students present this unique case: they are highly skilled and their stay is typically bound to an academic degree after which they bring back social connections (OECD, 2011, 2020). This, however, must be viewed in light of a recent graduate's young age, something that Hatzigeorgiou and Lodefalk (2015) find would inhibit their integration with labour markets and thus their effect on trade. Nevertheless, Murat (2014, 2018) finds that friendships and trust between international students and within alumni associations positively induce both exports and imports, which would suggest that international students have an advantage in fostering trade. I contribute to this discussion by expanding the country coverage, allowing me to dig deeper into the role of cultural differences, and examining additional measures of product-level information barriers.

This also allows me to contribute to the broader literature on trade and immigration. For example, Girma and Yu (2002) and Dunlevy (2006) find that the impact of immigration is higher for countries with dissimilar institutions and cultures. I find a comparable effect for the role of students. Other research exploits the importance of information a good requires to be traded, i.e. the more information frictions it has to go through, the more it can benefit from immigrants providing them. This means that differentiated goods trade benefits more from immigration than homogeneous goods trade (Rauch and Trindade, 2002). This was confirmed by Murat (2018)

for international student migration from Latin America. I expand on this by using both Rauch's (1999) classification and Nunn's (2007) classification which considers the contract intensity of a good.

In summary, the existing literature suggests that international student migration has a particular role in immigration driving trade. Furthermore, I anticipate that this impact will be greatest when cultural barriers are larger. Finally, one might also expect that students are especially important for products where information is important, although the inexperience of recent graduates may limit that effect. These are the hypotheses I wish to test using a broader data set than has been used to this point.

3 Econometric methodology and data

In the following section, I lay out my econometric model and show descriptive statistics of the data with particular attention to the student data.

3.1 Econometric model

My econometric model is the now-standard gravity model of trade. Specifically, I model exports from host country h to origin country o in year t as a function of, among other things the international students sent from o to h. My baseline specification employs country-pair specific covariates common to the literature, X_{oh}, and several fixed effects to estimate the effect of international students on trade. Following Aleksynska and Peri (2014) I control for total immigration and the share of students in total immigration.[2] This mitigates omitted variable bias due to confounding factors because migrants from one country seem to attract international students from the same country (Murat, 2014, 2018; Perkins and Neumayer, 2014). This gives the

[2] Aleksynska and Peri (2014) measure high-skilled migrants in the same manner.

following exports equation (the imports equation follows the same structure):

$$Exports_{oht} = exp(ot + ht + \beta_1 StudentShare_{oht-4} + \beta_2 TotalImmigration_{oht-4} + \beta_3 X_{oht} + \epsilon_{oht} \quad (1)$$

$TotalImmigration_{oht-4}$ is total immigration by country of origin in a host country at time $t-4$. The $StudentShare_{oht-4}$ is the share of international students in this total. The control variables, X_{oht}, include the time-invariant variables $Distance_{oh}$, $Contiguity_{oh}$, $Commonlanguage_{oh}$ and $Colony_{oh}$ as well as the time-variant variable $TradeAgreements_{oht}$. Note that except for distance these are all dummy variables. Country-year specific variables such as GDP or population are captured by country-year fixed effects. These also capture multilateral resistance (Anderson and Van Wincoop, 2003). In the disaggregated trade regressions I additionally include HS6-digit fixed effects. My standard errors are clustered by country-pair.

In equation (1), I use the $t-4$ values of total immigration and the student share due to endogeneity concerns. The endogeneity stems from omitted variables that affect students' migration preferences (Beine et al., 2016). Therefore, I follow Murat (2018) in lagging both variables by four years to mitigate reverse causality. Lagging these by the duration of the average university degree leads to a number of international students having finished their degree at the time I estimate their effect.

To deal with zeros in the value of exports and heteroskedasticity, I use Silva and Tenreyro's (2006) pseudo-poisson maximum likelihood (PPML) estimator in my preferred gravity-model specification.[3]

[3]Note that in the gravity specification, when using PPML, exports (in levels) are regressed on the log of the non-binary explanatory variables. If student migration is zero in a given *oht* triad, then this becomes undefined. Therefore, so as not to lose those observations, I do not log the *StudentShare* variable. I use the logarithm of *TotalImmigration* plus one, where the stock of total immigrants is zero to tackle this same problem of potential sample selection.

3.2 Data and descriptive statistics

For my empirical analysis, I consider 34 host and 172 origin countries from 2000 to 2018.[4] Depending on lagged variables, I end up with a fifteen year time period.

International students data The data on the number of internationally inbound students by country of origin are from UNESCO Institute for Statistics (UIS) (2020), which start in 1998 and are updated annually. UNESCO (2020) defines international students as "Students who have crossed a national or territorial border for the purpose of education and are now enrolled outside their country of origin." Thus, by definition the number of inbound international students excludes all other reasons for immigration, e.g. work.

As expected, there are a number of country pair-years with no or very little migration. Even when aggregating across years there is a skewed distribution with some countries attracting students from nearly everywhere and others hosting very few students.[5] The main hosts of international students are the United States, the United Kingdom and Australia (Appendix A Table 7 shows a list of the top ten hosts). From 2000 to 2018, Canada emerged to become one of the favourite destinations relative to its own population. This pattern suggests a strong global preference for English-speaking hosts (captured by the fixed effects and common language dummy). Figures 1 and 2 show this development over the 18-year time frame.[6][7]

[4] I start in 2000 because it is the year when student data on the major hosts, e.g. the USA, becomes available. Due to end of data truncation, I end my sample in the year 2018 (compare Appendix A Figure 4).

[5] As noted above, the fact that immigrants generally choose their host country has brought attention to a possible endogeneity problem in trade regressions on immigration (Beine et al., 2016).

[6] Figures made with Natural Earth. Free vector and raster map data @ `naturalearthdata.com`.

[7] Data on population are from The World Bank's World Development Indicators.

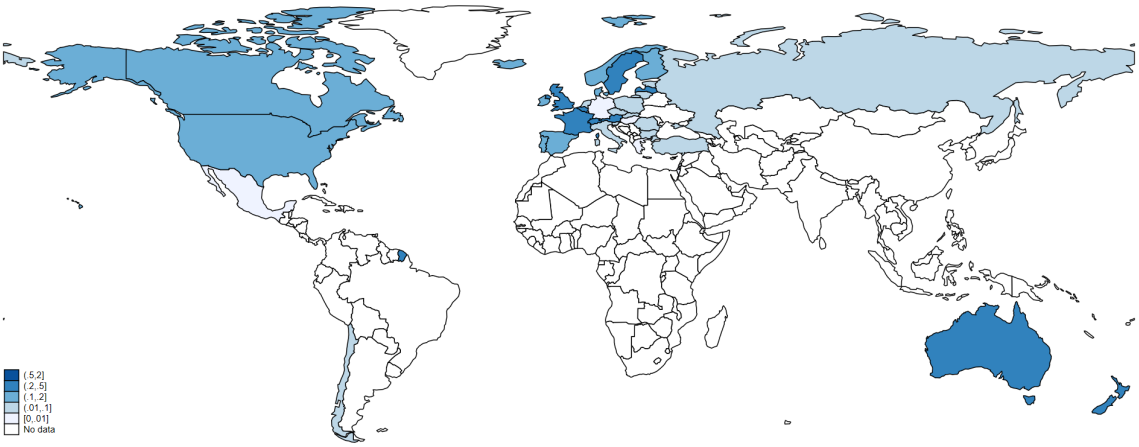

Figure 1: Number of students relative to population by host countries in 2000

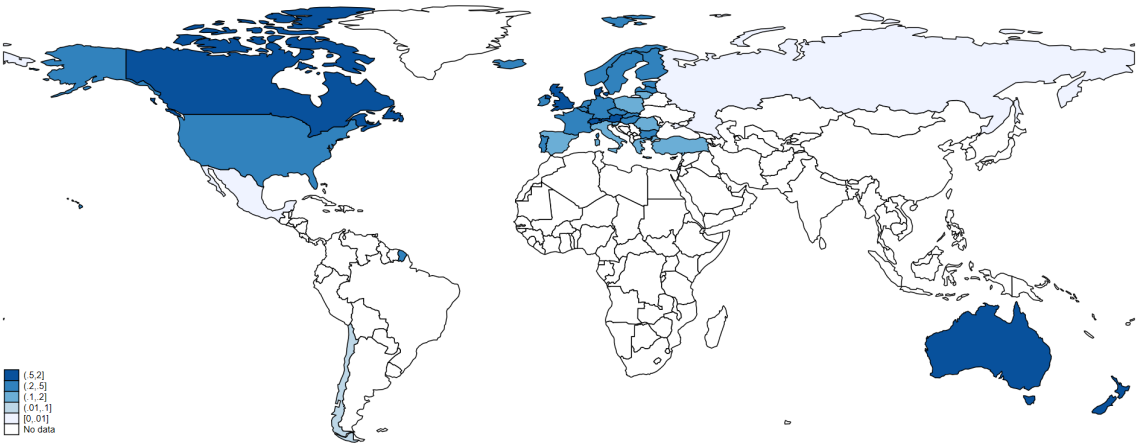

Figure 2: Number of students relative to population by host countries in 2018

On the origin side of the cross-border movement, there are no countries that never send any students to another country. In terms of numbers, Chinese and Indian students move across borders for foreign education the most, suggesting that large populations send more students (a factor again captured by the country-year fixed effects). As mentioned above, there is a clear indication that most student migration goes to OECD countries. In comparison, on average, only 42 students study yearly in a non-OECD member state between 2000 and 2018. Out of those 42 students, 22 come from an OECD member state. Nevertheless, there is an increase in international students every year. Somewhat unexpectedly, the within country-pair variation in the number of international students is high. For example, the standard deviation of Chinese students in the United States is around 99,000 students.

Immigration data Total immigration is the stock of the foreign born population by country of birth (origin) in a given host. The data are retrieved from the OECD (2020) International Migration database for immigrants in OECD countries.[8] To this, I add the above-discussed number of students.[9] Thus, the variable $TotalImmigration_{oht}$ includes both students and non-students, with $StudentShare$ controlling for relative share of students in the mix. One limitation of the immigration data is that they are essentially limited to OECD hosts.

Trade data The dependent variable, exports or imports between country-pairs by year, is measured in US dollars trade value and retrieved from the UN's (2020) Comtrade Database in HS96 nomenclature for the years 2000 to 2018. Exports are measured as what the host sends to a student's origin while imports are what the

[8]The OECD International Migration database also provides data on the stock of the foreign population by nationality. The difference between both measures is that the stock of foreign born immigrants is intended to refer only to first-generation immigrants whereas foreign population potentially captures more generations of migrants. I use the stock of foreign born immigrants because the length of their stay decreases the immigrants' returns to bilateral trade (Herander and Saavedra, 2005). If I used the stock of the foreign population, I would also consider the immigrants' descendants that grew up in the host country. Whether they still demand origin country products and have knowledge about origin country institutions is questionable.

[9]OECD's International Migration Database consists of data from population registers and censuses, residence permits, and labour force surveys. Given this method of collection and the short stay of international students, there is reason to expect that they are underrepresented in the OECD data.

origin sends to the host. When operating at the product-level, I use the trade at the 6-digit product level. The skewed distribution of the data and large number of zeros, especially at the product level, motivates my use of the PPML estimator.

In addition to trade values, for my product-level analysis I employ Rauch's (1999) product classification that classifies 4-digit SITC rev. 2 commodities into goods traded on an organised exchange, reference priced and differentiated products. Additionally, I created Nunn's (2007) contract-intensity measure that makes use of Rauch's (1999) product classification and retrieves a variable for intermediate input relationship-specificity, z^{rs1}. I do this to update the time span as well as the country coverage. To do so, I measured the proportion of differentiated inputs in an end-product using intermediate input data from the World Input-Output Database (2021) for 2000 through 2014 (WIOD, see Timmer et al. (2015)) and summed up over the input's relative value in a country's HS96 6-digit product k exports or imports at time t.[10] Thus, it measures an exported product's contract intensity for a given exporting country and year. This relationship-specificity parameter, z^{rs1}, is shown in Figure 3 for both, exports and imports. Most relationship-specificity values are at the extremes with most inputs being either differentiated or homogeneous.

Other The data on distance, common official language, contiguity and colonial history are from CEPII's (2020) GeoDist and Language datasets (see Mayer and Zignago (2011); Melitz and Toubal (2014)). I use the distance in kilometres between the most populated cities as the distance between the trading countries. *Colony* equals one if a country-pair have ever been in a colonial relationship. Trade agreements data are from Dür et al.'s (2014) DESTA list of dyadic treaties where the dummy variable equals one if the countries are in a trade agreement in year t.

[10]For a detailed description on the procedure of mapping these trade classifications, see Appendix B.

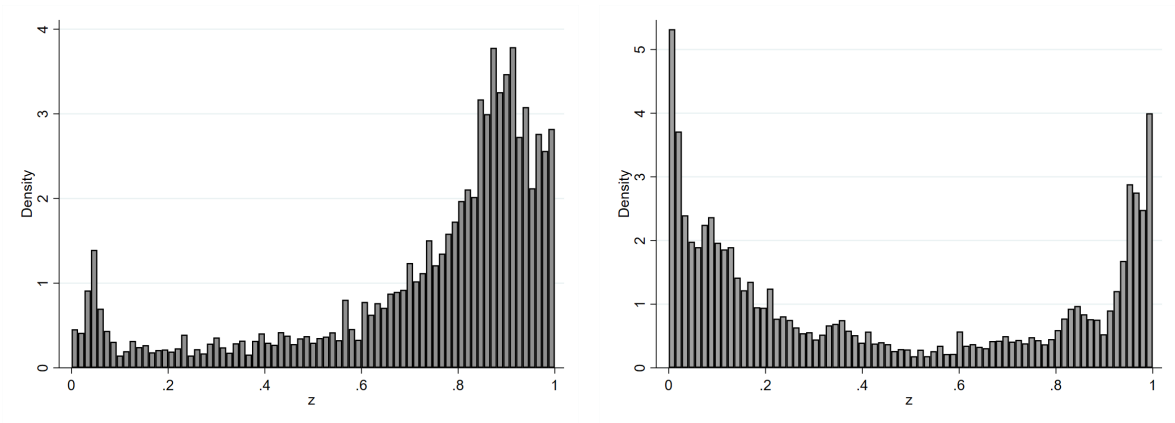

Figure 3: Recreated relationship-specificity parameter z^{rs1} in exports (left) and imports (right)

	Mean	SD	Min	Max	N
Exports (US$)	1945509510.38	1.05e+10	16.00	3.14e+11	30,119.00
Imports (US$)	3.08e+09	1.66e+10	1	4.80e+11	21,918.00
Student Share	0.05	0.13	0.00	1.00	30,119.00
Number of students	692.30	4,748.54	0.00	260,914.00	30,119.00
ln(Total Immigration)	6.63	3.25	0.00	16.28	30,119.00
Stock of foreign born population	31,614.21	264,212.78	0.00	11,746,539.00	30,119.00
ln(Distance)	8.52	0.89	4.09	9.88	30,119.00
Common official language	0.09	0.29	0.00	1.00	30,119.00
Contiguity	0.02	0.15	0.00	1.00	30,119.00
Trade Agreement	0.12	0.33	0.00	1.00	30,119.00
Colony	0.04	0.20	0.00	1.00	30,119.00

Table 1: Summary statistics

4 Regression Analysis

4.1 Baseline model

My baseline regression results are in Table 2. Focusing on exports in Column (1), as expected, the more distant the country-pair, the lower exports. In a similar sense, trade agreements increase exports. Although common language, contiguity and colonial history are not significant they have the anticipated sign.

Turning to the migration variables, total immigration has a significantly positive effect on exports: a 10% increase in total immigrants is associated with a 2.6% increase in exports from the host to the origin country. This result is higher than some other results in the literature but still in the expected range. For example, Head and Ries (1998) find an export elasticity of 0.1 for Canada and Dunlevy (2006) finds American export elasticity to lie between 0.29 (without fixed effects) and 0.47 (with fixed effects). As in Murat (2014, 2018) I find a positive association between the share of students and exports. As this holds the number of total immigrants (student and non-student) constant this means that students have a larger effect on exports than the average migrant.[11]

In Column (2), I turn to imports, that is, what the host imports from the origin. On the whole, the results are comparable to exports, including the total immigration variable. A notable exception is the *StudentShare* coefficient which, unlike for exports, is insignificant. Considering these two results, recall that exports can be affected by students in two ways: the information channel and the preference channel. Imports, on the other hand, should only have the information channel.[12] This then suggests that the preference channel is the driving force behind the student share coefficient. With this in mind, I now turn to differing sources of information frictions to explore the information channel in more detail.

[11]This association holds even when controlling for the fifth lag in the international students share and for emigrated students (see Appendix A, Table 8 and Table 9).

[12]Note that this differs from permanent migration as examined by Felbermayr and Toubal (2012) where the preference channel is for imports since this is what the migrants in the host bring in from the country of origin.

	(1) Exports	(2) Imports
$StudentShare_{t-4}$	0.944***	-0.188
	(0.334)	(0.521)
$ln(TotalImmigration)_{t-4}$	0.258***	0.317***
	(0.0212)	(0.0216)
ln(Distance)	-0.746***	-0.529***
	(0.0506)	(0.0500)
Language	0.146	0.292***
	(0.105)	(0.100)
Contiguity	0.129	0.151
	(0.0990)	(0.0945)
Trade Agreement	0.188**	0.448***
	(0.0741)	(0.0915)
Colony	0.0543	-0.173*
	(0.101)	(0.101)
Constant	26.22***	24.28***
	(0.541)	(0.544)
Country-year FE	YES	YES
N	30119	21918

Standard errors clustered by country-pair in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 2: Baseline regression

4.2 Information frictions and international students

Although the above results point to the preference channel, the specification used presumes that the relative importance of the preference and information channels is the same across countries and products. This, however, need not be the case and I explore this here.

Aggregate trade Previous literature suggests sharing a language, similar cultures and institutions reduces transaction costs that deter trade. As a result, immigrants can help to reduce those transaction costs with their worldly knowledge and contacts. This in turn leads to higher trade outcomes from migration when such barriers are large (Girma and Yu, 2002; Dunlevy, 2006). To examine this for international student migration, I first separate the origin countries into those with and without OECD membership.[13] Since the hosts are essentially all OECD members, I expect the information barriers to be greater for the non-OECD origins and therefore a larger impact for immigrants and students from non-OECD countries. If found, this would mirror Bratti et al. (2014) who find a higher effect on Italian exports of immigration from low-income countries than from high-income ones.

With this in mind, Table 3 shows this difference in the effect of the share of international students by OECD membership.[14] This result confirms that Girma and Yu's (2002) conjectures on immigration and trade hold for international student migration. Note that now, I find the same result for imports from non-OECD origins. This then suggests that the information channel matters more for trade between OECD and non-OECD countries.

[13]OECD members are the 34 countries that joined the OECD by 2010. Appendix A provides a list of these countries.

[14]In Appendix A Table 10 interacts the student share variable with OECD-membership and does not achieve significance.

	(1)	(2)	(3)	(4)
	Exports		Imports	
	OECD	non-OECD	OECD	non-OECD
$StudentShare_{t-4}$	0.835	0.834***	-0.0572	0.846**
	(0.563)	(0.250)	(0.774)	(0.330)
$ln(TotalImmigration)_{t-4}$	0.281***	0.131***	0.354***	0.134***
	(0.0283)	(0.0236)	(0.0263)	(0.0296)
ln(Distance)	-0.673***	-1.133***	-0.523***	-1.199***
	(0.0608)	(0.0766)	(0.0476)	(0.133)
Language	0.251**	-0.121	0.406***	0.0178
	(0.120)	(0.149)	(0.109)	(0.108)
Contiguity	0.169	0.117	0.0644	0.322
	(0.108)	(0.221)	(0.0924)	(0.252)
Trade Agreement	0.245***	-0.102	0.388***	0.517***
	(0.0829)	(0.198)	(0.0896)	(0.119)
Colony	-0.0467	0.620***	-0.235**	0.340**
	(0.116)	(0.135)	(0.108)	(0.136)
Constant	25.46***	30.93***	23.72***	32.77***
	(0.659)	(0.754)	(0.548)	(1.344)
Country-year FE	YES	YES	YES	YES
N	6526	22409	6527	14522

Standard errors clustered by country-pair in parentheses * p<0.10, ** p<0.05, *** p<0.01
All host countries are OECD members.

Table 3: Cultural dissimilarity: OECD and non-OECD origin countries

As an alternate approach, I can use proxies for information barriers, namely, the geographical distance between trading partners, whether they share a common official language or have been in a colonial relationship, and interact them with the immigration variables. Table 4 shows these results for exports in Columns (1) through (3) and imports for Columns (4) through (6). In Columns (1) and (4) we see that distance increases the effect of total immigration but at best only slightly increases the effect of the student share. The only other significant interaction is for colony and then only for exports (Column (2)) where, contrary to expectations, it has a positive coefficient suggesting students matter more when information barriers are low.[15] This suggests that, at least when discussing the particular role of international students, these may be weak proxies for cultural barriers.[16] Finally, note that the lack of significance on the common language interaction with students differs from Murat (2014) who finds a negative coefficient in import regressions. It should be noted, however, that in her sample, the UK is the only host. Given that even the raw data there is an attraction to English-speaking hosts, this may be the result of some other factor driving student migration that I can control for by using a broader set of hosts.

[15]This only holds for OECD-OECD trade and not when the origin country is non-OECD, see Appendix A Table 11. Note that within the OECD-OECD sample all colonial relationships are with the UK.

[16]An alternative rationale for the unexpected colony result is racism. If racial barriers are higher for immigrants from former colonial holdings, then the colony variable would be positively related to cultural barriers rather than inversely as is commonly anticipated. If this were the case, I would expect a negative coefficient on the colony variable itself which is what I find in Column (2).

	(1)	(2)	(3)	(4)	(5)	(6)
		Exports			Imports	
	Distance	Colony	Language	Distance	Colony	Language
$StudentShare_{t-4}$	-3.692	0.777**	0.865***	-2.277	-0.299	-0.210
	(2.692)	(0.341)	(0.328)	(3.664)	(0.513)	(0.521)
$ln(TotalImmigration)_{t-4}$	-0.250**	0.254***	0.255***	-0.165	0.317***	0.315***
	(0.102)	(0.0210)	(0.0208)	(0.108)	(0.0217)	(0.0214)
$StudentShare_{t-4}$ × ln(Distance)	0.556*			0.226		
	(0.324)			(0.416)		
$ln(TotalImmigration)_{t-4}$ × ln(Distance)	0.0599***			0.0562***		
	(0.0119)			(0.0126)		
$StudentShare_{t-4}$ × Colony		3.579***			2.528	
		(1.010)			(1.744)	
$ln(TotalImmigration)_{t-4}$ × Colony		0.104**			0.0337	
		(0.0511)			(0.0629)	
$StudentShare_{t-4}$ × Language			2.082			0.607
			(1.940)			(1.602)
$ln(TotalImmigration)_{t-4}$ × Language			0.0629			0.0709
			(0.0426)			(0.0452)
ln(Distance)	-1.419***	-0.756***	-0.743***	-1.150***	-0.532***	-0.524***
	(0.145)	(0.0515)	(0.0498)	(0.156)	(0.0500)	(0.0503)
Language	0.137	0.126	-0.696	0.307***	0.291***	-0.590
	(0.106)	(0.104)	(0.0426)	(0.105)	(0.0976)	(0.548)
Contiguity	0.286***	0.121	0.132	0.302***	0.150	0.148
	(0.0986)	(0.0979)	(0.0987)	(0.0908)	(0.0935)	(0.0950)
Trade Agreement	0.113	0.200***	0.186**	0.375***	0.448***	0.455***
	(0.0732)	(0.0730)	(0.0740)	(0.0864)	(0.0902)	(0.0904)
Colony	0.0268	-1.297**	0.0566	-0.212**	-0.668	-0.178*
	(0.0999)	(0.612)	(0.0977)	(0.102)	(0.736)	(0.100)
Constant	31.93***	26.34***	26.24***	29.61***	24.31***	24.26***
	(1.240)	(0.548)	(0.530)	(1.341)	(0.547)	(0.539)
Country-year FE	YES	YES	YES	YES	YES	YES
N	30119	30119	30119	21918	21918	21918

Standard errors clustered by country-pair in parentheses * p<0.10, ** p<0.05, *** p<0.01

Table 4: Culture interactions

Product-level trade Information frictions can be more costly for some goods than others: the more differentiated the good, the more information is necessary to trade it (Rauch, 1999).

Table 5 shows product-level trade disaggregated at the HS96 6-digit level, splitting the sample into goods traded on an organised exchange, reference priced, or differentiated based on Rauch's (1999) classification. Again, I investigate the effects on exports and imports separately. Beginning with exports (Columns (1)-(3)), the international student share seems to significantly increase the association that immigrants have on trade in differentiated products. Turning to imports (Columns (4)-(5)), the student share coefficient is again significant only for differentiated products, but then only barely so and indicating the opposite association. Thus, as in Table 2 the results suggest that the preference channel is the dominant one.[17]

That said, in Table 3 I found significant results for the student share in exports and imports after splitting the sample into OECD and non-OECD origins. With this in mind, Table 5 repeats this product decomposition but for just the OECD origins (the middle panel) and non-OECD origins (the bottom panel). For OECD origins, I find that students matter the most for organised exchange products, where both exports and imports are affected, and for imports of reference priced goods. In contrast, for non-OECD origins, they matter more for differentiated exports and reference priced imports. Thus, students seem to increase trade in the least differentiated products when informational barriers are low (OECD-OECD) and increase trade among more differentiated products when they are high (non-OECD-OECD). A potential explanation for this difference could be the role of experience in the two origin groups. In OECD origin countries, recent graduates may be most influential in the least differentiated goods, that is, while they might work in a differentiated products industry they lack the experience to influence with whom their company trades. In a non-OECD country, because these recent graduates are much more skilled than the local average, they may reach these positions more swiftly.

This latter matches expectations, that is, students help to overcome informational

[17]Table 12 reports that students only increase the immigrants' impact on consumption goods exports but not on capital and intermediate goods exports. This shows that international students develop a taste for host-country products.

barriers when they are high at both the country- and product-level. This suggests an important relationship between country-level barriers and product-specific ones when considering the role of student migration in trade.

	(1)	(2)	(3)	(4)	(5)	(6)
		Exports			Imports	
	Organised exchange	Reference priced	Differentiated	Organised exchange	Reference priced	Differentiated
$StudentShare_{t-4}$	1.837	0.599	0.798**	1.348	0.760	-1.511*
	(1.130)	(0.411)	(0.392)	(1.652)	(0.471)	(0.854)
$ln(TotalImmigration)_{t-4}$	0.191***	0.171***	0.265***	0.00400	0.202***	0.310***
	(0.0611)	(0.0219)	(0.0243)	(0.0694)	(0.0280)	(0.0301)
Constant	23.59***	17.64***	18.88***	26.76***	16.36***	18.23***
	(1.437)	(0.425)	(0.543)	(1.205)	(0.527)	(0.731)
Control variables	YES	YES	YES	YES	YES	YES
Country-year FE	YES	YES	YES	YES	YES	YES
HS96 6-digit FE	YES	YES	YES	YES	YES	YES
N	180503	907117	3568841	143012	644247	2304674
			OECD origin countries			
$StudentShare_{t-4}$	4.700***	0.551	-0.275	4.993***	1.543***	-0.462
	(1.254)	(0.680)	(0.628)	(1.316)	(0.511)	(0.877)
$ln(TotalImmigration)_{t-4}$	0.270***	0.212***	0.293***	0.216**	0.237***	0.360***
	(0.0653)	(0.0294)	(0.0309)	(0.102)	(0.0323)	(0.0303)
Constant	20.44***	17.24***	18.41***	22.71***	16.18***	18.15***
	(1.201)	(0.484)	(0.580)	(1.645)	(0.559)	(0.587)
Control variables	YES	YES	YES	YES	YES	YES
Country-year FE	YES	YES	YES	YES	YES	YES
HS96 6-digit FE	YES	YES	YES	YES	YES	YES
N	108992	505735	1709190	101724	477043	1630657
			non-OECD origin countries			
$StudentShare_{t-4}$	-0.935	-0.0124	1.223***	-4.219***	1.398**	0.664
	(1.608)	(0.518)	(0.267)	(1.405)	(0.619)	(0.525)
$ln(TotalImmigration)_{t-4}$	0.198**	0.0692**	0.122***	-0.175***	0.0612	0.0416
	(0.0817)	(0.0273)	(0.0228)	(0.0644)	(0.0519)	(0.0625)
Constant	21.99***	18.51***	23.63***	30.53***	17.06***	25.13***
	(3.280)	(0.820)	(0.819)	(1.861)	(1.562)	(2.830)
Control variables	YES	YES	YES	YES	YES	YES
Country-year FE	YES	YES	YES	YES	YES	YES
HS96 6-digit FE	YES	YES	YES	YES	YES	YES
N	67404	383280	1779560	34637	139376	568657

Standard errors clustered by country-pair in parentheses * p<0.10, ** p<0.05, *** p<0.01
When sample is split into OECD and non-OECD origin countries, all host countries are OECD members.

Table 5: Product differentiation

Finally, in Table 6 I used Nunn's (2007) relationship-specificity measure as an alternative indicator of differentiation. In this classification, high relationship-specific goods require business relationships and contracts for many of their inputs. Greif (1993) showed how a coalition of traders managed to overcome the absence of these institutions in the presence of information asymmetries between agents. If networks between international students and the host country provide market information and business trust, this should strengthen trade particularly in contract-intensive goods trades. To explore this, Table 6 splits the sample into high (above median) and low contract-intensive goods exports and imports.[18] This results in coefficients where the strongest effect is again for exports, and there most clearly for the high contract-intensity goods as expected.

As above, there may be reasons to expect differences between the OECD and non-OECD origins. In particular, countries with good legal institutions and contract enforcement (OECD) may have relatively small trust issues for students to overcome (Greif, 1993). I therefore again split the sample across origin groups. Doing this reveals two things. First, there is no difference between students and the average migrant within the OECD, suggesting that a strong legal system may be enough to overcome trust issues. This is not the case in the non-OECD subsample, however. There, students have a larger than average effect for all but low contract-intensity exports. Thus, this may indicate the importance of the familiarity gained via international student relationships for weak institution countries.[19]

[18]This is robust to using Nunn's (2007) original classification as shown in Table 14 in Appendix A.

[19]In the Appendix A Table 13, I combine the high and low contract-intensity products and find that for imports, the role of students is higher the higher the contract-intensity as one might expect.

	(1)	(2)	(3)	(4)
	Exports		Imports	
	Low	High	Low	High
$StudentShare_{t-4}$	0.820*	0.885**	0.489	-0.211
	(0.487)	(0.375)	(0.510)	(0.900)
$ln(TotalImmigration)_{t-4}$	0.193***	0.213***	0.265***	0.337***
	(0.0250)	(0.0280)	(0.0288)	(0.0337)
Constant	20.66***	19.80***	17.19***	18.62***
	(0.539)	(0.589)	(0.643)	(0.795)
Control variables	YES	YES	YES	YES
Country-year FE	YES	YES	YES	YES
HS96 6-digit FE	YES	YES	YES	YES
N	2321605	2619657	1396370	1350977
	OECD origin countries			
	(1)	(2)	(3)	(4)
	Low	High	Low	High
$StudentShare_{t-4}$	1.188*	0.911	0.506	0.0537
	(0.608)	(0.601)	(0.628)	(0.925)
$ln(TotalImmigration)_{t-4}$	0.237***	0.255***	0.280***	0.354***
	(0.0326)	(0.0380)	(0.0331)	(0.0355)
Constant	19.58***	18.90***	17.27***	18.32***
	(0.637)	(0.672)	(0.747)	(0.718)
Control variables	YES	YES	YES	YES
Country-year FE	YES	YES	YES	YES
HS96 6-digit FE	YES	YES	YES	YES
N	1215150	1357880	1192120	1144057
	non-OECD origin countries			
	(1)	(2)	(3)	(4)
	Low	High	Low	High
$StudentShare_{t-4}$	-0.791**	0.854**	3.673**	1.922**
	(0.402)	(0.384)	(1.851)	(0.865)
$ln(TotalImmigration)_{t-4}$	0.00387	0.114***	0.217**	0.168***
	(0.0422)	(0.0322)	(0.105)	(0.0625)
Constant	26.61***	24.65***	18.43***	37.06***
	(1.060)	(0.886)	(5.268)	(3.108)
Control variables	YES	YES	YES	YES
Country-year FE	YES	YES	YES	YES
HS96 6-digit FE	YES	YES	YES	YES
N	1088912	1235948	178077	182508

Standard errors clustered by country-pair in parentheses
* p<0.10, ** p<0.05, *** p<0.01
When sample is split into OECD and non-OECD origin countries, all host countries are OECD members.

Table 6: Contract intensity

5 Conclusion

There is now a large body of evidence suggesting that immigration increases trade. Increasingly focus has been given to the composition of those migrants by comparing high-skill migrants to others. One type of high-skill migrant not often discussed is the international exchange student. The temporary nature of their stay provides a useful example to separate the two main drivers of the immigrant-trade link: the preference channel and the information channel. Overall, I find that student migrants have a larger than average association with trade. This is especially true for students from non-OECD countries where informational barriers may be most severe. This is reinforced by findings that indicate that students from these countries most affect products where issues of information and trust are major. In contrast, students from OECD origins seem to play little role in overcoming information barriers but rather impact trade the most in less-differentiated products. This may result from the time it takes to reach a position of influence in these products.

From a policy perspective, these results suggest that one way to encourage trade growth with developing countries is to provide funding and support that increases international student exchange. Additionally, if experience plays a role, then providing international students with internships and other hands-on opportunities may help origin countries upgrade their export product basket or better connect them to global supply chains via imported intermediates. Policies in this direction might include allowing students to be employed as part of their student visas or giving students the opportunity to extend their visas after graduation.

The goal of this paper has been to provide a close investigation of the relationship between international student migration and trade across a broad set of countries and products. Doing so shows that the type of immigrant matters in their ability to promote trade in general and which products in particular. Therefore, it is up to future research to continue studying the mechanisms through which immigrant networks transmit information and in doing so take into account the differences between immigrants.

6 Bibliography

International Standard Industrial Classification of All Economic Activities. Revision 4, Series M: Miscellaneous Statistical Papers, No. 4 Rev. 4, New York: United Nations. ST/ESA/STAT/SER.M/4/REV.4.

Aleksynska, M. and Peri, G. (2014). Isolating the network effect of immigrants on trade. *The World Economy*, 37(3):434–455.

Anderson, J. E. and Van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. *American economic review*, 93(1):170–192.

Beine, M., Bertoli, S., and Fernández-Huertas Moraga, J. (2016). A practitioners' guide to gravity models of international migration. *The World Economy*, 39(4):496–512.

Bratti, M., De Benedictis, L., and Santoni, G. (2014). On the pro-trade effects of immigrants. *Review of World Economics*, 150(3):557–594.

CEPII (2020a). GeoDist. `http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6`.

CEPII (2020b). Language. `http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=19`.

Dunlevy, J. A. (2006). The influence of corruption and language on the protrade effect of immigrants: Evidence from the american states. *Review of Economics and Statistics*, 88(1):182–186.

Dür, A., Baccini, L., and Elsig, M. (2014). The design of international trade agreements: Introducing a new dataset. *The Review of International Organizations*, 9(3):353–375.

Egger, P. H., Ehrlich, M. v., and Nelson, D. R. (2020). The trade effects of skilled versus unskilled migration. *Journal of comparative economics*, 48(2):448–464.

Felbermayr, G. J. and Jung, B. (2009). The pro-trade effect of the brain drain: Sorting out confounding factors. *Economics Letters*, 104(2):72–75.

Felbermayr, G. J. and Toubal, F. (2012). Revisiting the trade-migration nexus: Evidence from new oecd data. *World Development*, 40(5):928–937.

Girma, S. and Yu, Z. (2002). The link between immigration and trade: Evidence from the united kingdom. *Weltwirtschaftliches Archiv*, 138(1):115–130.

Gould, D. M. (1994). Immigrant links to the home country: empirical implications for us bilateral trade flows. *The Review of Economics and Statistics*, pages 302–316.

Greif, A. (1989). Reputation and coalitions in medieval trade: evidence on the maghribi traders. *The journal of economic history*, 49(4):857–882.

Greif, A. (1993). Contract enforceability and economic institutions in early trade: The maghribi traders' coalition. *The American economic review*, pages 525–548.

Hatzigeorgiou, A. and Lodefalk, M. (2015). Trade, migration and integration–evidence and policy implications. *The World Economy*, 38(12):2013–2048.

Head, K. and Ries, J. (1998). Immigration and trade creation: econometric evidence from canada. *Canadian journal of economics*, pages 47–62.

Herander, M. G. and Saavedra, L. A. (2005). Exports and the structure of immigrant-based networks: the role of geographic proximity. *Review of Economics and Statistics*, 87(2):323–335.

Jansen, M. and Piermartini, R. (2009). Temporary migration and bilateral trade flows. *World Economy*, 32(5):735–753.

Mayer, T. and Zignago, S. (2011). Notes on cepii's distances measures: The geodist database. Working Papers 2011-25, CEPII. `http://www.cepii.fr/CEPII/en/publications/wp/abstract.asp?NoDoc=3877`.

Melitz, J. and Toubal, F. (2014). Native language, spoken language, translation and trade. *Journal of International Economics*, 93(2):351–363.

Murat, M. (2014). Out of sight, not out of mind. education networks and international trade. *World Development*, 58:53–66.

Murat, M. (2018). Foreign education and international trade: empirical evidence from selected latin american countries. *International Review of Applied Economics*, 32(1):84–103.

Nunn, N. (2007). Relationship-specificity, incomplete contracts, and the pattern of trade. *The Quarterly Journal of Economics*, 122(2):569–600.

OECD (2011). *International Migration Outlook 2011*. `https://www.oecd-ilibrary.org/content/publication/migr_outlook-2011-en`.

OECD (2020). *Education at a Glance 2020*. `https://www.oecd-ilibrary.org/content/publication/69096873-en`.

OECD (2020). International migration database. `https://stats.oecd.org/Index.aspx?DataSetCode=MIG`. Date of extraction: 24/09/2020.

Perkins, R. and Neumayer, E. (2014). Geographies of educational mobilities: Exploring the uneven flows of international students. *The Geographical Journal*, 180(3):246–259.

Rauch, J. E. (1999). Networks versus markets in international trade. *Journal of international Economics*, 48(1):7–35.

Rauch, J. E. and Trindade, V. (2002). Ethnic chinese networks in international trade. *Review of Economics and Statistics*, 84(1):116–130.

Silva, J. S. and Tenreyro, S. (2006). The log of gravity. *The Review of Economics and statistics*, 88(4):641–658.

Startz, M. (2016). The value of face-to-face: Search and contracting problems in nigerian trade. *Available at SSRN 3096685*.

The World Bank (2021). World Development Indicators: (1) United Nations Population Division. World Population Prospects: 2019 Revision. (2) Census reports

and other statistical publications from national statistical offices, (3) Eurostat: Demographic Statistics, (4) United Nations Statistical Division. Population and Vital Statistics Reprot (various years), (5) U.S. Census Bureau: International Database, and (6) Secretariat of the Pacific Community: Statistics and Demography Programme. https://databank.worldbank.org/reports.aspx?source=World-Development-Indicators. Date of extraction: 17/02/2020.

Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R., and De Vries, G. J. (2015). An illustrated user guide to the world input–output database: the case of global automotive production. *Review of International Economics*, 23(3):575–605.

UN (2020). Comtrade Database. https://comtrade.un.org/.

UNESCO Institute for Statistics (UIS) (2020). http://data.uis.unesco.org/. Date of extraction: 23/10/2020.

United Nations (2002). Classification by broad economic categories. https://ec.europa.eu/eurostat/ramon/other_documents/bec/BEC_Rev_4.pdf.

World Input-Output Database (2021). WIOD Release 2016. World Input-Output Tables. http://www.wiod.org/database/wiots16. Date of extraction: 21/04/2021.

7 Appendix

7.1 A

List of all origin countries (ISO 3166 alpha-3 code)
AFG, AGO, ALB, AND, ARE, ARG, ARM, ATG, AUS, AUT, AZE, BDI, BEN, BFA, BGD, BGR, BHR, BHS, BIH, BLR, BLZ, BMU, BOL, BRA, BRB, BRN, BTN, CAF, CAN, CHE, CHL, CHN, CMR, COG, COK, COL, COM, CPV, CRI, CUB, CYP, CZE, DEU, DJI, DMA, DNK, DOM, DZA, ECU, EGY, ERI, ESP, EST, FIN, FJI, FRA, FSM, GAB, GBR, GEO, GHA, GIN, GMB, GNB, GRC, GRD, GTM, GUY, HKG, HND, HRV, HTI, HUN, IDN, IND, IRL, IRN, IRQ, ISL, ISR, ITA, JAM, JOR, JPN, KAZ, KEN, KGZ, KHM, KIR, KNA, KOR, KWT, LAO, LBN, LBR, LBY, LCA, LKA, LTU, LVA, MAR, MDA, MDG, MEX, MHL, MLI, MLT, MOZ, MRT, MUS, MWI, MYS, NER, NGA, NIC, NIU, NLD, NOR, NPL, NRU, NZL, OMN, PAK, PAN, PER, PHL, PLW, PNG, POL, PRT, PRY, QAT, RUS, RWA, SAU, SEN, SGP, SLB, SLE, SLV, SOM, STP, SUR, SVK, SVN, SWE, SYC, SYR, TCD, TGO, THA, TJK, TKM, TON, TTO, TUN, TUR, TUV, TZA, UGA, UKR, URY, USA, UZB, VCT, VEN, VNM, VUT, YEM, ZAF, ZMB, ZWE
List of all host countries (ISO 3166 alpha-3 code)
AUS, AUT, BGR, CAN, CHE, CHL, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, HUN, IRL, ISL, ISR, ITA, LTU, LVA, MEX, NLD, NOR, NZL, POL, PRT, RUS, SVK, SVN, SWE, TUR, USA
List of OECD member states (ISO 3166 alpha-3 code)
AUS, AUT, BEL, CAN, CHL, CZE, DNK, EST, FIN, FRA, DEU, GRC, HUN, ISL, IRL, ISR, ITA, JPN, KOR, LUX, MEX, NLD, NZL, NOR, POL, PRT, SVK, SVN, ESP, SWE, CHE, TUR, GBR, USA

Table 7: List of top 5 host countries

Country	Total number of students in 2018
USA	967612.88
GBR	451668
AUS	430066
DEU	263247
FRA	223103

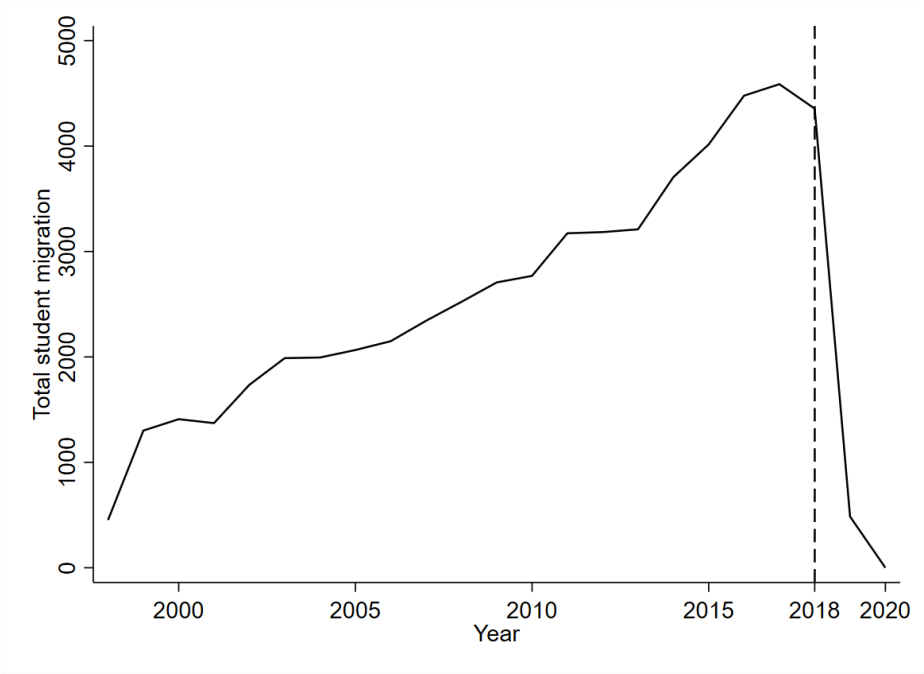

Figure 4: Data truncation from 2018: Total student number (in thousands) based on the number of international students from UNESCO (2020)

	(1)	(2)	(3)	(4)	(5)	(6)
		Exports			Imports	
$StudentShare_{t-4}$	0.0500	0.870**	0.0363	0.200	-0.228	0.238**
	(0.318)	(0.359)	(0.125)	(0.543)	(0.790)	(0.112)
$StudentShare_{t-3}$	1.035***			-0.394		
	(0.326)			(0.753)		
$StudentShare_{t-5}$		0.192			0.0437	
		(0.313)			(0.579)	
$ln(TotalImmigration)_{t-4}$	-0.0104	0.395***	0.0338*	0.0357	0.300***	-0.0252
	(0.0896)	(0.0939)	(0.0197)	(0.0949)	(0.0923)	(0.0233)
$ln(TotalImmigration)_{t-3}$	0.280***			0.300***		
	(0.0869)			(0.0962)		
$ln(TotalImmigration)_{t-5}$		-0.126			0.0435	
		(0.0996)			(0.0910)	
ln(Distance)	-0.730***	-0.736***		-0.498***	-0.490***	
	(0.0541)	(0.0549)		(0.0503)	(0.0515)	
Language	0.115	0.109		0.276***	0.283***	
	(0.108)	(0.112)		(0.102)	(0.105)	
Contiguity	0.102	0.113		0.127	0.110	
	(0.104)	(0.110)		(0.0981)	(0.104)	
Trade Agreement	0.198***	0.217***	-0.000970	0.440***	0.456***	0.101**
	(0.0765)	(0.0779)	(0.0432)	(0.0911)	(0.0939)	(0.0493)
Colony	0.0727	0.0633		-0.192*	-0.199*	
	(0.102)	(0.107)		(0.105)	(0.108)	
Constant	25.98***	26.05***	23.34***	23.87***	23.75***	24.41***
	(0.594)	(0.613)	(0.227)	(0.573)	(0.601)	(0.276)
Country-year FE	YES	YES	YES	YES	YES	YES
Country-pair FE	NO	NO	YES	NO	NO	YES
N	26513	23561	29406	18926	16790	21312

Standard errors clustered by country-pair in parentheses * p<0.10, ** p<0.05, *** p<0.01

Table 8: Baseline robustness

	(1) Exports	(2) Imports
$StudentShare_{t-4}$	1.246**	0.745
	(0.580)	(0.808)
$EmigrantStudentShare_{t-4}$	0.710	1.121*
	(0.861)	(0.604)
$ln(TotalImmigration)_{t-4}$	0.144***	0.206***
	(0.0491)	(0.0565)
$ln(TotalEmigration)_{t-4}$	0.220***	0.163***
	(0.0574)	(0.0486)
ln(Distance)	-0.500***	-0.476***
	(0.0566)	(0.0557)
Language	0.367***	0.329***
	(0.119)	(0.127)
Contiguity	0.154	0.169*
	(0.105)	(0.101)
Trade Agreement	0.129	0.262***
	(0.0850)	(0.0936)
Colony	-0.188	-0.162
	(0.119)	(0.114)
Constant	23.14***	22.87***
	(0.665)	(0.660)
Country-year FE	YES	YES
N	3482	3482

Standard errors clustered by country-pair in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Bilateral migration

	(1) Exports	(2) Imports
$StudentShare_{t-4}$	1.303***	0.0270
	(0.437)	(0.580)
$StudentShare_{t-4} \times$ OECD	-0.753	-0.285
	(0.716)	(0.963)
$ln(TotalImmigration)_{t-4}$	0.272***	0.296***
	(0.0241)	(0.0285)
$ln(TotalImmigration)_{t-4} \times$ OECD	-0.0243	0.0384
	(0.0195)	(0.0288)
ln(Distance)	-0.742***	-0.530***
	(0.0511)	(0.0477)
Language	0.136	0.294***
	(0.106)	(0.0994)
Contiguity	0.143	0.114
	(0.105)	(0.101)
Trade Agreement	0.181**	0.473***
	(0.0752)	(0.0942)
Colony	0.0517	-0.179*
	(0.103)	(0.102)
Constant	26.26***	24.22***
	(0.555)	(0.539)
Country-year FE	YES	YES
N	28936	21052

Standard errors clustered by country-pair in parentheses
* p<0.10, ** p<0.05, *** p<0.01
All host countries are OECD members.

Table 10: Interaction with OECD membership

	Exports					
	OECD			non-OECD		
	Distance	Colony	Language	Distance	Colony	Language
$StudentShare_{t-4}$	-3.977	0.450	0.633	-4.024	0.835***	0.939***
	(3.228)	(0.591)	(0.554)	(5.857)	(0.253)	(0.253)
$ln(TotalImmigration)_{t-4}$	-0.248*	0.276***	0.279***	-0.0368	0.131***	0.126***
	(0.133)	(0.0279)	(0.0281)	(0.149)	(0.0240)	(0.0234)
$StudentShare_{t-4}$ × ln(Distance)	0.653			0.548		
	(0.419)			(0.665)		
$ln(TotalImmigration)_{t-4}$ × ln(Distance)	0.0642***			0.0194		
	(0.0161)			(0.0172)		
$StudentShare_{t-4}$ × Colony		5.346***			-0.0492	
		(1.483)			(1.318)	
$ln(TotalImmigration)_{t-4}$ × Colony		0.151**			0.00220	
		(0.0723)			(0.0345)	
$StudentShare_{t-4}$ × Language			6.187***			-2.221
			(1.897)			(2.563)
$ln(TotalImmigration)_{t-4}$ × Language			0.113**			0.0283
			(0.0560)			(0.0411)
ln(Distance)	-1.400***	-0.695***	-0.681***	-1.347***	-1.134***	-1.156***
	(0.190)	(0.0633)	(0.0610)	(0.218)	(0.0777)	(0.0760)
Language	0.250**	0.209*	-1.362*	-0.138	-0.122	-0.321
	(0.122)	(0.118)	(0.713)	(0.149)	(0.150)	(0.554)
Contiguity	0.313***	0.158	0.157	0.158	0.122	0.0993
	(0.108)	(0.110)	(0.108)	(0.243)	(0.250)	(0.219)
Trade Agreement	0.179**	0.256***	0.224***	-0.101	-0.102	-0.0949
	(0.0845)	(0.0814)	(0.0824)	(0.189)	(0.200)	(0.184)
Colony	-0.0923	-1.991**	-0.0311	0.641***	0.597	0.593***
	(0.118)	(0.850)	(0.111)	(0.143)	(0.432)	(0.125)
Constant	31.44***	25.69***	25.55***	32.76***	30.93***	31.17***
	(1.585)	(0.670)	(0.660)	(1.925)	(0.771)	(0.753)
Country-year FE	YES	YES	YES	YES	YES	YES
N	6526	6526	6526	22409	22409	22409
	Imports					
$StudentShare_{t-4}$	-1.408	-0.220	-0.0775	8.459*	0.840**	0.851**
	(3.534)	(0.793)	(0.752)	(4.623)	(0.337)	(0.333)
$ln(TotalImmigration)_{t-4}$	-0.267**	0.351***	0.355***	-0.214	0.137***	0.128***
	(0.131)	(0.0260)	(0.0264)	(0.169)	(0.0303)	(0.0302)
$StudentShare_{t-4}$ × ln(Distance)	0.159			-0.857		
	(0.464)			(0.529)		
$ln(TotalImmigration)_{t-4}$ × ln(Distance)	0.0741***			0.0408**		
	(0.0156)			(0.0198)		
$StudentShare_{t-4}$ × Colony		2.252			0.537	
		(1.757)			(1.862)	
$ln(TotalImmigration)_{t-4}$ × Colony		0.101			-0.0156	
		(0.0708)			(0.0563)	
$StudentShare_{t-4}$ × Language			1.199			0.234
			(2.292)			(1.105)
$ln(TotalImmigration)_{t-4}$ × Language			0.131**			0.0582
			(0.0571)			(0.0388)
ln(Distance)	-1.348***	-0.535***	-0.511***	-1.563***	-1.195***	-1.208***
	(0.192)	(0.0474)	(0.0506)	(0.259)	(0.133)	(0.135)
Language	0.429***	0.379***	-1.221*	0.00926	0.0245	-0.702
	(0.117)	(0.108)	(0.715)	(0.103)	(0.107)	(0.476)
Contiguity	0.228***	0.0537	0.0486	0.227	0.271	0.325
	(0.0861)	(0.0912)	(0.0917)	(0.212)	(0.241)	(0.252)
Trade Agreement	0.337***	0.396***	0.401***	0.456***	0.518***	0.509***
	(0.0894)	(0.0887)	(0.0898)	(0.121)	(0.119)	(0.119)
Colony	-0.298**	-1.496*	-0.244**	0.283**	0.490	0.344**
	(0.116)	(0.843)	(0.110)	(0.137)	(0.684)	(0.135)
Constant	30.62***	23.85***	23.61***	35.82***	32.69***	32.92***
	(1.606)	(0.546)	(0.576)	(2.295)	(1.356)	(1.370)
Country-year FE	YES	YES	YES	YES	YES	YES
N	6527	6527	6527	14522	14522	14522

Standard errors clustered by country-pair in parentheses * p<0.10, ** p<0.05, *** p<0.01
All host countries are OECD members.

Table 11: Culture interaction by OECD membership

	(1) Capital	(2) Intermediate	(3) Consumption
$StudentShare_{t-4}$	0.357	0.629	0.655**
	(0.358)	(0.418)	(0.325)
$ln(TotalImmigration)_{t-4}$	0.187***	0.158***	0.197***
	(0.0200)	(0.0255)	(0.0207)
ln(Distance)	-0.589***	-0.560***	-0.603***
	(0.0555)	(0.0522)	(0.0431)
Language	0.349***	0.0239	0.244**
	(0.0704)	(0.136)	(0.110)
Contiguity	0.146	0.186*	0.236***
	(0.101)	(0.0977)	(0.0845)
Trade Agreement	0.0722	0.195**	-0.164**
	(0.0923)	(0.0803)	(0.0767)
Colony	-0.173**	-0.00358	0.0594
	(0.0817)	(0.114)	(0.0967)
Constant	19.19***	19.56***	18.83***
	(0.521)	(0.556)	(0.427)
Country-year FE	YES	YES	YES
HS96 6-digit FE	YES	YES	YES
N	3039516	9501714	4917479

Goods are separated into System of National Accounts (SNA) classes as in United Nations (2002).
Capital goods BEC are 41 and 521.
Intermediate goods BEC are 111, 121, 21, 22, 31, 322, 42 and 53.
Consumption goods BEC are 112, 122, 522, 61, 62 and 63.
Standard errors clustered by country-pair in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 12: BEC classification on exports

	(1) Exports	(2) Imports
$StudentShare_{t-4}$	0.760	-2.491*
	(0.845)	(1.281)
$StudentShare_{t-4} \times$ z	0.0990	4.375**
	(0.968)	(1.880)
$ln(TotalImmigration)_{t-4}$	0.111***	0.192***
	(0.0350)	(0.0336)
$ln(TotalImmigration)_{t-4} \times$ z	0.113***	0.200***
	(0.0310)	(0.0401)
z	-0.926**	-2.401***
	(0.391)	(0.665)
ln(Distance)	-0.639***	-0.452***
	(0.0516)	(0.0561)
Language	0.166	0.389***
	(0.121)	(0.123)
Contiguity	0.252**	0.0594
	(0.114)	(0.115)
Trade Agreement	0.0444	0.279***
	(0.0876)	(0.0942)
Colony	-0.0383	-0.254**
	(0.106)	(0.121)
Constant	21.03***	19.40***
	(0.636)	(0.724)
Country-year FE	YES	YES
HS96 6-digit FE	YES	YES
N	4941391	2747544

Standard errors clustered by country-pair in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Interaction with contract intensity

	(1)	(2)	(3)	(4)
	Exports		Imports	
	Low	High	Low	High
$StudentShare_{t-4}$	0.457	0.724**	-0.166	-0.998
	(0.315)	(0.337)	(0.417)	(0.654)
$ln(TotalImmigration)_{t-4}$	0.153***	0.248***	0.190***	0.272***
	(0.0227)	(0.0212)	(0.0256)	(0.0266)
ln(Distance)	-0.598***	-0.537***	-0.380***	-0.403***
	(0.0448)	(0.0470)	(0.0500)	(0.0583)
Language	0.0226	0.344***	0.166	0.356***
	(0.116)	(0.0740)	(0.126)	(0.107)
Contiguity	0.283***	0.214**	0.305***	0.178*
	(0.0917)	(0.0984)	(0.0892)	(0.104)
Trade Agreement	0.0223	0.105	0.305***	0.405***
	(0.0775)	(0.0792)	(0.0797)	(0.0987)
Colony	0.0312	-0.261***	-0.0849	-0.383***
	(0.0847)	(0.0932)	(0.110)	(0.104)
Constant	19.63***	18.26***	17.62***	17.89***
	(0.483)	(0.487)	(0.539)	(0.622)
Country-year FE	YES	YES	YES	YES
HS96 6-digit FE	YES	YES	YES	YES
N	7797581	8334540	5525380	5684497

Standard errors clustered by country-pair in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14: Nunn's (2007) original classification

7.2 B

Mapping trade classifications To merge UN COMTRADE's HS96 6-digit trade data with WIOD's (2016) input-output tables in ISIC Rev. 4, I added ISIC Rev. 3, Rev. 3.1 and lastly Rev. 4 classifications utilizing UN Statistics Division's Classifications on economic statistics tables (`https://unstats.un.org/unsd/classifications/Econ`) and World Integrated Trade Solution (WITS)'s Product Concordance (`https://wits.worldbank.org/product_concordance.html`). Another helpful guide to map with ISIC Rev. 4 codes was UN's (2008) statistical paper "International Standard Industrial Classification of All Economic Activities. Revision 4" to map divisions with classes.

I applied a similar procedure for converting HS96 6-digit data into SITC2 4-digit and ISIC Rev. 2 to include Rauch and Trindade's (2002) and Nunn's (2007) measures and to include BEC.

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