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## Learn German, buy German? Language-learning opportunities abroad and exports

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*Learn German, Buy German?  
Language-learning opportunities  
abroad and exports*

Omar Martin Fieles-Ahmad | Matthias Huber

JENA ECONOMIC RESEARCH PAPERS · # 2021-008

# Learn German, Buy German? Language-learning opportunities abroad and exports\*

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## Abstract

Using data on the presence of the Goethe Institutes (GI) in 134 importer countries between 1978 and 2014, we study the effect that language learning opportunities abroad have on German exports. We employ a gravity model of trade with a single exporter and use the Poisson-Pseudo Maximum Likelihood (PPML) estimator to measure the relationship of interest. To gauge the importance of potential reverse causality, we also estimate the effect that institutes have on Swiss exports. Our findings for both Germany and German-speaking Swiss cantons show that institutes do stimulate exports to GI-hosting countries, but that this effect is confined to institutes offering language training services, which suggests that language requirements and acquisition underlie the positive link found between institutes and exports. This reading of our findings receives further support in additional explorations, where we study exports differentiated by Rauch (1999) product categories to account for differing communication requirements in trading.

*JEL classification:* C23, F14, Z10.

*Keywords:* gravity model, foreign trade, language, cultural institute.

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## 1 Introduction

Language skills may be an important prerequisite for and driver of international trade. By reducing transaction costs that otherwise impede trade, language skills may make trade viable, or at least more profitable and hence intensify the exchange of goods and services between countries. Language-related transaction costs<sup>1</sup>, of course, are far from uniform across goods and trading partners. They are particularly high for economic activities and exchanges that require extensive written and verbal communication (Selmier and Oh 2013). They can also be prohibitively high, in which case trade will not be viable at all, and otherwise mutually beneficial transactions are not realized (Fidrmuc and Fidrmuc 2016).

Although language commonality appears to be a rather simple measure to relate language skills to trade costs, its performance is rather impressive as Head and Mayer (2014) show in a meta-analysis. A more fine-grained way of including language skills in gravity models are measures of linguistic distance. Different indices of linguistic distance have been utilized in empirical research, which shows that such measures are generally negatively related to trade flows (Melitz and Toubal 2014; Isphording and Otten 2013). Indices of linguistic distance, however, lack variability over time and also ignore potential foreign language skill acquisition, which might help to overcome trade impediments arising from linguistic distance. While Egger and Toubal (2016) solve the latter problem by estimating the effect of common acquired language on bilateral trade, their measure still is invariant over time. Exploiting the fall of the iron curtain as a natural experiment, Fidrmuc and Fidrmuc (2016) produce evidence that foreign language skills (here English) affect trade flows.

These pieces of evidence support the view that language and language acquisition matter for trade flows. Policies that increase domestic language skills abroad hence offer a potential tool for countries to promote their exports. In this paper, we explore and test this possibility of export promotion. Specifically, using data on openings and closings of institutes provided by the German Goethe Institute (GI) in different countries (Uebelmesser et al. 2018), we study the effect that language learning opportunities (LLOs) provided by such institutes have on German exports to countries hosting these institutes. The Goethe Institut is a German cultural institute that offer language services, information on the German culture and host cultural events in countries all over the world.<sup>2</sup> Using a single-exporter gravity model of trade, we estimate the effect that the number of such institutes in a country has on German exports to that country. Our main sample contains annual observations on 134 countries for the period 1978 to 2014. Our findings, which we corroborate in a battery of robustness checks, show a significant positive but diminishing marginal impact of institutes on trade flows to a country, i.e. a non-linear effect of institutes on German exports. Our main sample contains annual observations of 134 countries for the period between 1978 and 2014. We find a non-linear effect of the number of institutes on German exports which suggests a positive but marginally decreasing impact of the institutes.

Closest to our research are Ghosh et al. (2017), Lien and Lo (2017), Lien et al. (2012), and

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<sup>1</sup>The importance of transaction costs for economic activity and market exchanges more generally was first recognized and studied by Coase (1937) in the 1930s (Williamson 1985).

<sup>2</sup>In this paper we stick to the following convention: when referring to the association of the Goethe-Institut we use the abbreviation “GI”. When talking about specific branches of the GI abroad, we refer to them as “institutes”.

Lien et al. (2019) who show a positive relationship between the establishment of different cultural institutes (GI for Germany, Cervantes Institute for Spain, Confucius Institute for China, British Council for the United Kingdom) and trade flows. We can add two contributions to that particular strand of literature.

First, we explore and provide evidence for a particular causal pathway of this effect and also address the issue of reverse causality that may beset empirical studies in the area, as openings and closings of cultural institutes might not be exogenous to export flows from the country that runs such institutes. We deal with this problem by estimating the effect of German institutes on Swiss exports. The German government decides jointly with the GI where to establish institutes, but not jointly with the Swiss government or any other Swiss institution, nor do parties participating in the decision take Swiss exports into account. The decision to operate a institute is hence exogenous to Swiss export flows. We are also able to distinguish Swiss exports from German-speaking cantons and from non-German-speaking cantons. Using this information, we provide evidence that institutes stimulate exports from the German-speaking part of Switzerland, but not from the non-German-speaking part of Switzerland to countries hosting these institutes.

Second, while Ghosh et al. (2017), Lien and Lo (2017), Lien et al. (2012), and Lien et al. (2019) see cultural institutes as a way of increasing soft power (Nye 2004), we further investigate language as a channel which facilitates communication and therefore reduces transaction cost. The results for Switzerland already provide some suggestive evidence that language might be a channel of the effect. Additionally, we show that language services are the driver of the results by distinguishing between institutes that offer language services, and those that do not. Furthermore, we categorize export flows according to Rauch's (1999) product categories that account for the different need for communication and different search costs when trading certain products. While homogeneous goods are traded on an organized exchange where only little communication is needed, differentiated goods do not have reference prices and an economic interaction requires a certain degree of communication between the trading entities. We find that there is no significant association between the number of institutes and the export with homogeneous goods, while the export of differentiated goods increases with the number of institutes present in the country. We conclude that language is the relevant channel.

Concerning the literature on language and trade, our findings hence provide further and more general evidence for the importance of acquired language skills for international trade flows. This is of potential policy relevance, as acquired language skills (but not the sharing of a common language or linguistic distance) can be targeted and manipulated by policy as a means of export promotion. An investigation of heterogeneous effects shows that trade-promoting effects are largest when initial trade barriers are high.

The paper is organized in the following way. Section 2 gives background information on the literature on language in the context of international trade and on the GI. Section 3 describes the data and outlines our estimation strategy. In Section 4 we show our results for German and Swiss exports and that language is the driver by distinguishing exports according to the Rauch (1999) product categories. Section 5 concludes.

## 2 Background

### 2.1 Language and international trade

As trading is an act that heavily depends on written and verbal communication, language plays an integral part in facilitating economic interactions between trading partners (Selmier and Oh 2013). Trade frictions caused by linguistic differences can be analysed in the transaction cost framework, since such frictions represent costs of using the market (e.g., costs for contracting and safeguarding)(Williamson 1981). Apart from mere communication, language also functions as a carrier of cultural and social norms which on the one hand potentially enhances trust between trade partners and on the other hand could shape preferences for certain (cultural) goods (Disdier et al. 2010; Egger and Toubal 2016). Language as a component of these transaction costs has been used in various applications of gravity models explaining international trade patterns. Most studies make use of binary indicators of language commonality, i.e. common official languages or common native languages, as well as measures for fractional spoken language overlap such as common spoken languages (Egger and Toubal 2016). In a meta-analysis Egger and Lassmann (2012) collect coefficients for common languages (official or spoken) and provide an estimate which implies a 44% increase in trade flows between countries due to a common language.<sup>3</sup> Helpman et al. (2008), in turn, estimates a common language to increase by 10 % the probability of bilateral trade between two countries.

Deviating from the dichotomous common-language perspective, measures of linguistic proximity facilitate a more fine-grained analysis of the impact of communication difficulty on trade between countries. Popular measures for linguistic proximity consist of cardinal measures that make use of the level languages share on a language family tree (Guiso et al. 2009; Adserà and Pytliková 2015) or of continuous scales that express lexicographic and/or phonetic similarities such as the Levenshtein distance as used by Isphording and Otten (2013). A continuous measure for linguistic proximity allows for the calculation of elasticities in the context of the gravity model of trade. Isphording and Otten (2013) find that a 1 percentage point increase in the Levenshtein distance leads to a significant decrease in trade by about 0.6%. However, these concepts are not free of criticism. A major disadvantage of these indices is the necessity for symmetric linguistic distances between languages which implies a similar difficulty in foreign language acquisition that goes both ways (Van der Slik 2010).

The majority of the previously mentioned measures (apart from common spoken languages), that frequently enter gravity models of trade, are time-invariant and for the most part no relevant policy variables. In reality, however, there are several ways to alleviate the language barrier between two trading partners: migration (Rauch and Trindade 2002; Melitz and Toubal 2014), automated translation (Brynjolfsson et al. 2019) or foreign language acquisition (Fidrmuc and Fidrmuc 2016). The aspect of language acquisition is central to this paper as the GI is offering German language courses worldwide. According to Ginsburgh et al. (2017) one of the driving forces to learn a foreign language is trade with a country where the respective language is spoken. This evokes a severe problem of reverse causality which Fidrmuc and Fidrmuc (2016) tackled by using the fall of the iron curtain as a natural experiment and exploiting differences in foreign language proficiency in Eastern Europe that have been exogenous to trade. For the analysis of the impact of language

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<sup>3</sup>Head and Mayer (2014) provide comparable effects in a similar analysis of trade costs.

learning opportunities abroad offered by the GI another layer of this problem arises since also the opening of an institute could be partially driven by trade with Germany. Studies on the impact of cultural institutes on foreign trade are still of quite recent vintage (Ghosh et al. 2017; Lien and Lo 2017; Lien et al. 2012; Lien et al. 2019) and have not specifically explored the role that language courses as a potential causal pathway play for the link between cultural institutes and trade flows.

Intuitively closing the cultural gap between trading partners as well as improving communication should be beneficial for foreign trade between countries. Nevertheless, there are products which require more communication effort and/or mutual trust than others. The theoretical basis for this argument is best reflected in Williamson (1979) and Williamson (1985) which consider asset-specificity to be the driving force for the governance cost<sup>4</sup> necessary to trade products. Non-specific assets therefore cause only little governance costs when traded on a market compared to more specific assets. With an increasing asset specificity more hierarchical types of organizations tend to generate much lower governance costs than the market.

Similar to this transaction cost view, Rauch (1999) argues that trade frictions (e.g. search costs) are increasing with the degree of differentiation of the products. In order to formulate categories to distinguish the products, Rauch (1999) offers a tripartite system: products that are traded on an organized exchange (homogeneous goods), products that are listed in trade publications and therefore have a reference price (listed goods) and products that do not have a reference price and are potentially bought from a specific supplier (differentiated goods). According to Rauch (1999), the latter category of differentiated goods is expected to be most affected by search costs (as an obstacle to trade). Rauch (1999) finds that sharing colonial ties and/or a common language has a positive effect on all three categories but is most beneficial for the trade with differentiated products. Melitz and Toubal (2014) add to this research by analyzing the impact of different concepts of common languages (common native/spoken/official language) on trade. They find that especially the trade with differentiated goods benefits from common languages. Egger and Toubal (2018) additionally account for acquired language commonality. They find that acquired language commonality has a positive effect on trade with differentiated goods whereas the effects for homogeneous were mostly statistically insignificant. Investigating the special case of Switzerland as a multilingual country Egger and Lassmann (2015) apply a spatial regression discontinuity design to show the causal impact of common native languages in foreign trade. Their findings show that common native languages especially impact the extensive margin in foreign trade rather than the intensive margin. Also here the effect sizes differ across the three Rauch (1999) categories suggesting a particular importance for trading differentiated products. These results suggest that the role of language is more prominent when it comes to trading of more complex products. Finally, Felbermayr and Toubal (2010) show that cultural proximity positively impacts international trade with differentiated goods but find no effect on homogeneous goods.

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<sup>4</sup>According to Williamson (1989) governance is defined as the means to create order, mitigate conflict and realize mutual gains. The costs of the usage of a type of governance (market, hybrid, hierarchy) are therefore of administrative and bureaucratic nature.

## **2.2 The Goethe-Institut**

As a cultural institute, the Goethe-Institut (and its branches, i.e. the individual institutes) acts on the behalf of the German government and contributes to Germany's foreign cultural policy. The main duty of the GI is to promote German language and culture worldwide. The GI is closely connected to the Federal Foreign Office (FFO) which provides the main funding for the GI. Only language services are funded by fees (Goethe-Institut 2014).

Regarding the promotion of language, the GI offers language courses and standardized exams, provides scholarships and trains local German teachers to improve the quality of teaching. Furthermore, the GI builds on cultural exchange and cooperation by offering cultural events and providing information on German culture and society, e.g. by maintaining libraries. These services are provided by institutes distributed all over the world. Figure 1 shows countries with institutes in 2014. In that year, 143 institutes were operating in 93 countries. 126 of these institutes offered language services. Uebelmesser et al. (2018) provide a comprehensive overview on the history of the GI and its institutes, paying particular attention to the development of language learning at the GI.

When it comes to the decision of opening and closing institutes, the GI works together with the FFO. These decisions are influenced by many factors, such as legal, social and political aspects of the host countries, recent global and regional changes, and the main objective of the GI, i.e. promoting German culture and language (Uebelmesser et al. 2018; Huber and Uebelmesser 2019). Analysing the determinants of openings and closings of institutes and the stock of institutes in operation, Jaschke and Keita (2021) find that the share of German exports to a country does not have a significant influence on any of these three measures, i.e. the stock of institutes and their turnover. Lien and Oh (2014) show for the case of the Confucius institute that among FDI flows, geographical distance and development status of a country, also trade is an important determinant for the establishment of Confucius Institutes. Thus, the reasonable suspicion arises that also German trade affects openings of institutes and therefore we need to deal with the issue of reverse causality (see Section 4.2).

## **3 Data and empirical strategy**

### **3.1 Data**

#### **3.1.1 Dependent variable: exports**

To study trade flows from Germany to other countries, we use export data (measured in current British pounds) provided by Fouquin and Hugot (2016), which mainly draws on the Trade Statistics by the International Monetary Fund. In additional explorations investigating Swiss trade flows, we use Swiss export data provided by the Swiss Federal Customs Office.

In order to distinguish German exports according to different trade categories that are potentially heterogeneously affected by linguistic and cultural differences we use data provided by Comtrade (2019). From these data, we were able to extract German exports according to their Standard International Trade Classification (SITC) Revision 2 and 3 on a four-digit level and aggregate them to homogeneous and differentiated goods following the classification suggested by Rauch (1999). The trade values can potentially differ depending on the reporting country. A German export is reported by Germany as well as





have reported their numbers jointly in the annual reports by the GI (for more information on the different types of institutes in the dataset, refer to Uebelmesser et al. (2018)). Second, there are relatively few institutes without language services (see Figure 4).

### **3.1.3 Other control variables**

We control for several factors that are associated with export flows and that may confound, if ignored, the relation between language learning opportunities abroad and trade. First, importing country GDP controls for the economic (business-cycle) condition in, and the economic size of, the importing country. Second, to proxy trade openness of an importer country, we consider the relation of its total imports to its GDP. Third, we include a control for the population size of an importer country and an indicator for its membership in the General Agreement on Trade and Tariffs (GATT). All these data are provided by Fouquin and Hugot (2016). Finally, we control for trade agreements with two dummy variables provided by Mario Larch's Regional Trade Agreements Database from Egger and Larch (2008). The first one indicates for each year if both Germany and the importer country are members of a customs union. For the Swiss case, there is no variation in this variable and we omit it in our regressions. Second, we include a dummy variable that indicates whether the importer country has a free trade agreement (FTA) and/or an economic integration agreement (ETA) with Germany (Switzerland).

### **3.1.4 Sample construction**

We construct our sample in a way to get a balanced sample for 1978-2014. After excluding Switzerland, Luxembourg and Austria as (partly) German-speaking countries, we end up with a balanced sample of 134 countries for the aggregated export flows.<sup>5</sup> For the analysis of homogenous and differentiated goods (Section 4.3), we balance our sample over the same time period (1978-2014) across the two categories which results in 95 importing countries with positive trade flows from Germany. In order to keep the samples comparable, we start the observation period for both samples in 1978, as for the conversion tables provided by Rauch (1999) the reported data have to be categorized according to the second or third revision of SITC on a 3- or 4-digit level. These have been reported by Germany starting in 1978. Additionally, the problem of joint reporting of two or more institutes and therefore the uncertainty about the supply of language services was especially large in the beginning of the 1970s, before 1978.

### **3.1.5 Descriptive statistics**

Our main sample consists of 134 countries. The GI was never present in 60 countries in our period of observation, while 24 countries had institutes in some of the years and 50 countries had institutes throughout the whole period. Figure 2 shows a map of the countries in our main sample. Figure 3 presents the number of countries with and without institutes for each year in the observation period. While the number of countries with institutes increased until the 1990s, at the end of the 1990s the number started to decrease to 57 between 2000 and 2004. In the latter years, the number rose again and peaked in 2014 with 68 countries. While the number of countries with institutes has increased, the number of institutes itself has decreased since the beginning of the 1990s as can be seen in Figure 4. The number of institutes that do not offer language courses stays fairly

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<sup>5</sup>We balance our sample to assure comparability across different specifications. In Section 4.1.1, we show that results do not depend on balancing the sample, but also hold for an unbalanced sample

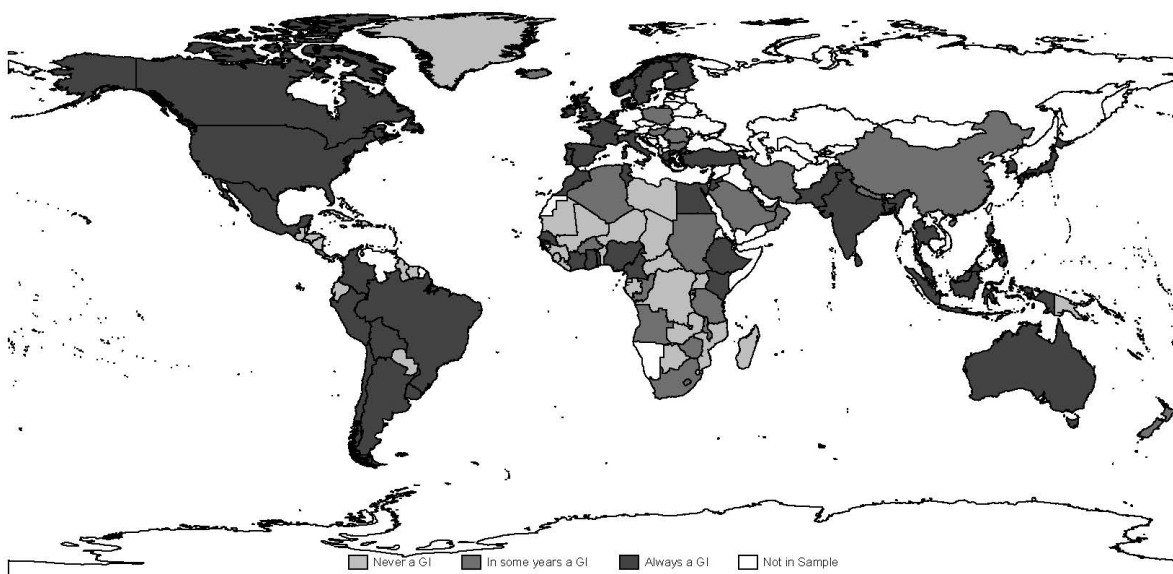


Figure 2: Map of countries and the presence of institutes in the sample.

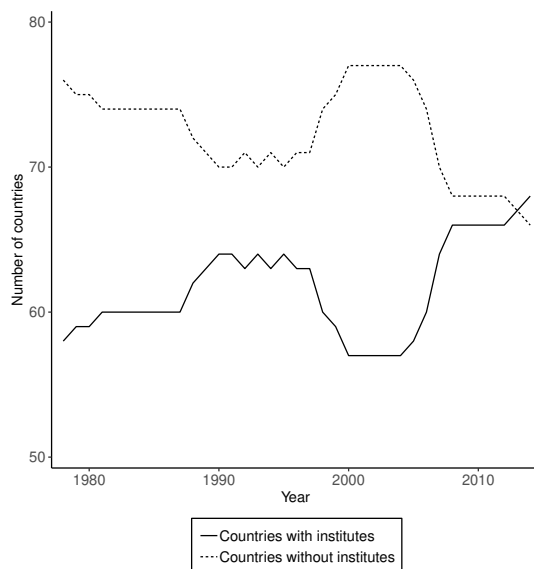


Figure 3: Number of countries with institutes in the sample.

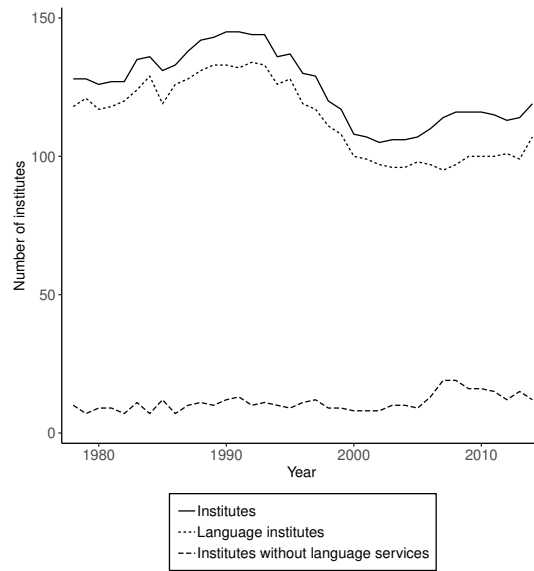


Figure 4: Number of institutes in the sample.

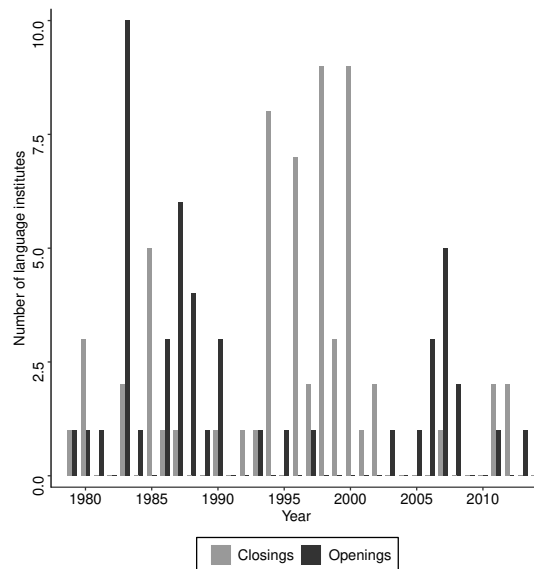


Figure 5: Openings and closings of institutes in the sample.

constant and rather small throughout the observation period.<sup>6</sup> For our estimation we use the variation of number of institutes per country, which includes openings and closings of institutes. An overview over openings and closings over time is presented in Figure 5.

In our sample, the countries that on average receive the highest German exports are France, the US, Italy, Great Britain, and Belgium. Only 22 country-year observations exhibit zero trade flows. Average exports to a country in our data are worth around 2.3 billion British Pounds. Median exports, however, are only about 7.7 million British Pounds, which indicates that the distribution of exports is highly left-skewed, with relatively few but very large importers. Table 1 provides summary statistics for the variables we use in the analysis.

Table 1: Summary statistics

Variable	Obs		Mean	Std. Dev.	Min	Max
German exports in Mill. GBP	4958	Overall	2298.73	7522.31	0	84331.43
Number of institutes	4958	Overall	0.93	1.62	0	12
		Between		1.56	0	8.57
		Within		0.45	-2.64	5.50
Number of language institutes	4958	Overall	0.80	1.33	0	9
		Between		1.26	0	6.4865
		Within		0.43	-3.21	5.04
Number of institutes without lang. serv.	4958	Overall	0.08	0.43	0	6
		Between		0.32	0	2.92
		Within		0.29	-1.84	4.49
Population (in 1000)	4958	Overall	37630.76	137105.80	49.2	1364270
GDP in Mill. GBP	4958	Overall	135012.90	615356.80	12.02	10700000
Total Imports/GDP	4958	Overall	0.48	1.34	0.04	45.81
Customs Union	4958	Overall	0.10	0.30	0	1
FTA/EIA	4958	Overall	0.13	0.34	0	1
GATT	4958	Overall	0.76	0.43	0	1

### 3.2 Theoretical background and empirical strategy

Originating from Newton’s law of gravity, the gravity model in economics provides a useful framework to analyze international trade patterns. In simple terms the gravity model explains trade as an increasing function of the economic size of trading partners and decreasing with respect to trade frictions. In the field of international trade it has been used by Tinbergen (1962) for the first time. It soon developed into a widely used tool in empirical analyses which exhibit a sound foundation in trade theory (Anderson and Van Wincoop 2003). In the current application of the gravity model, the analysis centers around a single exporter (Germany) and its trade relations with other countries. While this setting does not allow to check for multilateral resistance, since only trade flows from one country are considered, it has the essential advantage that it permits to distinguish exports from imports (Földvári 2006) and hence to analyse the effects of the opening of a cultural institute as a tool for export promotion. Our choice of control variables (see Section ??) is mainly motivated by the extensive overview by Head and Mayer (2014) of the gravity model as a workhorse in international trade.

<sup>6</sup>In Figure 4, we assume that all institutes that are jointly reported offer language services.

Under the presence of heteroskedasticity, estimates of the gravity model are biased and inconsistent if estimated with fixed-effects ordinary least squares including a log-linearized version of the dependent variable. Santos Silva and Tenreyro (2006) show that estimating gravity models of trade with the Poisson pseudo-maximum likelihood (PPML) estimator has the advantage to be consistent and unbiased in the presence of heteroskedasticity. Additionally, the PPML estimator solves the problem of including zero trade flows, as the dependent variable is included in levels (not logs). By using the PPML estimator in our empirical analysis, we follow other researchers who estimated trade flows from but a single exporter (Lien et al. 2019; Johnston et al. 2015). Drawing from the theoretical specification of the gravity model, we estimate the following equation:

$$y_{jt} = \alpha' \mathbf{GI}_{jt} + \beta' \mathbf{x}_{jt} + \phi'_t \mathbf{d}_t + \phi'_j \mathbf{d}_j + \eta_{jt} \quad (1)$$

where  $y_{jt}$  represents exports from Germany to the importer country  $j$  in year  $t$ .  $\mathbf{GI}$  represents the vector of GI related variables, our main variables of interest. For each specification we estimate, we always control for the number of institutes and its square to capture the possibly non-linear effect of another additional institute. In our main specification, we use the number of all institutes.  $\mathbf{x}_{jt}$  is the vector of control variables. It includes the log of the population in the importer country  $j$ , dummy variables indicating joint membership of the European customs union, an EIA or FTA between Germany and the importer country  $j$  in year  $t$ , and whether the importer country  $j$  is a member of the GATT. Furthermore, we control for economic conditions in the importer country with the log of GDP. As a measure for trade openness, we include the share of total imports in GDP. We also include two sets of dummies to control for importer country effects, respectively year fixed effects. Specifically, year dummies  $d_t$  control for importer-invariant effects, and importer dummies  $d_j$  control for time-invariant characteristics of the importer country  $j$  and its relations with Germany.  $\eta_{jt}$  denotes the error term. We cluster standard errors at the importer country level.

## 4 Results

### 4.1 German exports

#### 4.1.1 Main results

Table 2 shows PPML regression results for seven basic specifications of trade flows from Germany to 134 importer countries. The interpretation of coefficients estimated by PPML is equivalent to that of coefficients estimated by OLS when the dependent variable is in logs: coefficients of independent variables in logs can be interpreted as elasticities, and coefficients of independent variables in levels capture semi-elasticities. We sequentially introduce control variables in columns (1)-(4). Column (5) shows results when GI variables are omitted as regressors. As is evident, estimated coefficients remain statistically significant (with one exception) and also of similar magnitude to those reported in column (4). The one exception is the coefficient on log population, which is now slightly smaller and also imprecisely estimated. Column (6) relates the number of institutes to the population size of an importer country, instead of considering their absolute number, and column (7) uses an unbalanced (and hence larger) sample.

Table 2: Estimation results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>DV: Exports</b>							
Institutes	0.317*** (0.099)	0.170*** (0.052)	0.144*** (0.043)	0.139*** (0.043)			0.122*** (0.036)
Institutes sq.	-0.017*** (0.005)	-0.011*** (0.003)	-0.010*** (0.002)	-0.010*** (0.002)			-0.009*** (0.002)
Inst./pop. in mill.						1.059*** (0.320)	
Inst./pop. in mill. sq.						-0.259*** (0.081)	
log GDP		0.846*** (0.053)	0.772*** (0.052)	0.786*** (0.052)	0.804*** (0.058)	0.794*** (0.054)	0.796*** (0.048)
log population		-0.555* (0.312)	-0.428 (0.260)	-0.425* (0.255)	-0.344 (0.294)	-0.405* (0.244)	-0.421 (0.265)
CU			0.555*** (0.111)	0.550*** (0.110)	0.573*** (0.141)	0.573*** (0.115)	0.454*** (0.117)
FTA/EIA			0.167* (0.088)	0.167* (0.086)	0.219** (0.088)	0.182** (0.082)	0.153* (0.079)
GATT			0.265*** (0.098)	0.255*** (0.096)	0.299*** (0.114)	0.279** (0.114)	0.138 (0.085)
Import share				0.088*** (0.022)	0.092*** (0.023)	0.087*** (0.020)	0.095*** (0.026)
Constant	19.100*** (0.041)	7.845 (4.904)	7.283* (4.314)	6.870 (4.251)	5.139 (4.879)	6.387 (4.098)	3.211 (2.977)
Observations	4,958	4,958	4,958	4,958	4,958	4,958	6,206
R-squared	0.970	0.991	0.992	0.992	0.991	0.991	0.992
Countries	134	134	134	134	134	134	184
Years	1978-2014	1978-2014	1978-2014	1978-2014	1978-2014	1978-2014	1978-2014
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Cluster-robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Before focusing on our main variables of interest, we briefly discuss the coefficients of the control variables. The estimated coefficient for GDP in the importer country is positive and significant in all specifications. The estimated coefficient for population size in the importer country is negative and significant at the 10 %-level in column (4). Being a member of the European Union Customs Union (EUCU), i.e. the only customs union in which Germany is a member, increases German exports to a country. The positive effect of an EIA and/or FTA membership is only significant in PPML estimations at the 10 %-level. GATT membership increases exports significantly. This effect vanishes in the unbalanced sample in column (7). Finally, importer country's openness to trade measured by total imports/GDP has a positive and significant effect on German exports.

We next turn to our main variable, which captures German language learning opportunities in importer countries. We hypothesized that an increase in German language learning opportunities in a country increases German exports to that country. And indeed, this is what we find. As shown in column (4), the coefficient for an additional institute is 0.139 and highly significant. However, the marginal effect of an additional institute is highest for the first institute in a country and is decreasing with increasing number of institutes, which can be seen by the negative and significant effect of the associated squared term of institutes.

Column (6) tests if the estimated effect depends on the size of the population (or market) an institute serves in an importer country, as proxied by the ratio of language institutes to total population (in million inhabitants). With this specification, we are accounting for differences in openings between large (e.g. India) and small (e.g. Hungary) countries. As it turns out, the estimated effect remains positive and significant, i.e. robust to the use of this alternative measure.

Finally we want to test if our results depend on our choice of a balanced sample, i.e. our decision to consider only countries with non-missing observations in all years in 1978-2014. Column (7) shows results for an unbalanced sample with 184 countries. As can be seen, our results turn out robust to this change in sample, but the sizes of our two coefficients turn out slightly smaller than in column (4).

#### 4.1.2 Heterogenous effects for country groups

Table 3: Heterogenous effects for country groups

	(1)	(2)	(3)	(4)	(5)	(6)
DV: exports	advanced economies	non-advanced economies	Germanic language	non-Germanic language	members of EUCU	non-members of EUCU
Institutes	0.106** (0.044)	0.416*** (0.115)	0.045 (0.037)	0.197*** (0.058)	0.049* (0.028)	0.169** (0.073)
Institutes sq.	-0.008*** (0.003)	-0.076*** (0.009)	-0.004* (0.002)	-0.020*** (0.004)	-0.012*** (0.002)	-0.011*** (0.004)
Observations	2,479	2,479	629	4,329	506	4,452
R-squared	0.992	0.997	0.994	0.994	0.994	0.991
Years	1978-2014	1978-2014	1978-2014	1978-2014	1978-2014	1978-2014
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Cluster-robust standard errors in parentheses. Other controls (log (GDP), log population, CU, FTA/EIA, GATT, import share and constant are included, but not shown. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



The effect of institutes on German exports to a country might also be sensitive to, i.e. vary with, certain importer country characteristics. We therefore perform subgroup analyses for groups of importer countries differentiated by their economic development, their linguistic distance to German, and their membership status in the EUCU. Table 3 reports the results. We find that the results of all three subgroup analysis go in the same direction: countries with already lower trade barriers benefit less from an institute than those countries with higher trade costs. This indicates that economies that are facing higher trade barriers initially, benefit most from the establishment of institutes.

First, we split the sample according to importer countries' economic development. We classify a country as an advanced (non-advanced) economy if its average GDP/capita over the observation period is larger (smaller) than the median GDP/capita of importer countries in our sample. Columns (1) and (2) show for both subsamples a significant and positive but decreasing effect of the institute numbers, an effect that is much more pronounced, however, for non-advanced economies. These findings are similar to those of Lien et al.'s (2019).

Second, we split the sample according to the linguistic distance between the language spoken by the majority of the population in the importer country and the German language (Adserà and Pytliková 2015). In column (3), we consider only countries with a Germanic language, in column (4) only countries where the majority of the population speaks a non-Germanic language. As is evident, institutes only exert an effect on German exports in countries in which the majority of the population speaks a non-Germanic language. This result might be explained either by the fact that in these countries German is already a more common language or that the knowledge of English is even better and therefore used as lingua franca for economic exchanges. As described in Section 2.1, linguistic distance increases costs of trade, in particular communication costs. Consequently, an institute helps to overcome these larger costs and creates a larger potential for cost reductions than for linguistically closer languages where communication costs are already less.

Third, when splitting up the sample into members and non-members of the EUCU, we find that the effect for non-members is much larger and also more precisely estimated than the effect for members of the EUCU. A potential explanation for this finding is the following. While trade barriers within EUCU are already very low, language skills might be of help to overcome existing language barriers and increase trade in non-member states of the EUCU.

All three sub-group analyses suggest that the benefit from the openings of institutes is larger for economies that face higher trade barriers.

#### **4.2 Reverse causality: the case of Switzerland**

One of the reasons for opening or closing an institute may be trade promotion. If so, then our main explanatory variable is not exogenous to German exports and the relationship we estimate between institutes and trade flows suffers from reverse causality. The GI together with the German government decides whether and where to open or close institutes. However, neither of them consults the Swiss government or any other Swiss institution, nor does any Swiss institution have any say in this regard. Openings and closing of institutes should hence be exogenous to Swiss exports. Following Huber and Uebelmesser (2019), who first made use of this reasoning and identification strategy in the context

Table 4: Estimation results: Swiss exports

	(1)	(2)	(3)	(4)	(5)	(6)
DV: Exports	CHE (German-speaking)			CHE (non-German-speaking)		
Institutes	0.094* (0.050)	0.134*** (0.047)	0.137*** (0.047)	0.104 (0.080)	0.100 (0.064)	0.100 (0.064)
Institutes sq.	-0.008*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.007 (0.003)	-0.007* (0.004)	-0.007* (0.004)
log GDP	0.574*** (0.090)	0.615*** (0.080)	0.618*** (0.079)	0.589*** (0.104)	0.599*** (0.088)	0.599*** (0.087)
log population	0.060 (0.208)	-0.068 (0.185)	-0.062 (0.179)	-0.029 (0.250)	-0.013 (0.199)	-0.010 (0.198)
FTA/EIA = 1	0.167*** (0.051)	0.150*** (0.051)	0.149*** (0.051)	0.090 (0.085)	0.089 (0.083)	0.088 (0.083)
GATT	0.252 (0.218)	0.149 (0.123)	0.145 (0.123)	-0.170 (0.343)	-0.225 (0.172)	-0.225 (0.172)
Import share	0.094** (0.044)	0.098** (0.045)	0.099** (0.045)	0.119** (0.059)	0.120** (0.059)	0.120** (0.059)
Constant	1.286 (3.297)	2.519 (3.201)	3.036 (2.315)	1.013 (2.956)	0.566 (2.752)	2.537 (1.898)
Observations	2,680	3,340	3,584	2,680	3,340	3,584
R-squared	0.984	0.983	0.984	0.987	0.987	0.988
Countries	134	167	183	134	167	183
Years	1995-2014	1995-2014	1995-2014	1995-2014	1995-2014	1995-2014
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Cluster-robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

of migration, we hence replace German exports with Swiss exports as our dependent variable. Furthermore, distinguishing between Swiss exports from German-speaking and non-German-speaking cantons in Switzerland allows us to perform a placebo test for the German-speaking part of Switzerland, i.e. we see this part of Switzerland as non-treated by German language-learning opportunities and therefore expect no significant effect of the GI variables.

Export data for Switzerland at the canton level are available from 1995. We aggregate export flows by cantons that do speak primarily German (German cantons) and cantons that do not (non-German cantons).<sup>7</sup> We estimate our preferred specification<sup>8</sup> (Table 2 Column 4) for the three regions the German-speaking part of Switzerland (Table 4 Column 1-3), the non-German-speaking part of Switzerland (Table 4 Column 4-6), Germany (Table A1 Column 1-3) and Switzerland (Table A1 Column 4-6). For each region, we run regressions using three different estimation samples for the period 1995-2014. The first sample contains exactly the same countries as the main sample and is therefore balanced. The second includes all 167 countries for which we have balanced observations for all three regions. The third sample includes all available observations for all three regions, i.e. this third sample is unbalanced, and it contains observations on 183 importer countries.

As shown in Table A1 columns (1)-(3), which consider German exports for the shorter

<sup>7</sup>The canton with the lowest share of German native speakers (68.3 %) classified as German-speaking is Graubünden. The canton with the highest share of German native speakers (29.2 %) that is classified as non-German-speaking canton is Fribourg. 18 out of the total of 26 cantons are classified as German-speaking cantons.

<sup>8</sup>The control variable indicating membership in a customs union is omitted for Switzerland, as there is no variation in this variable in the data.

period 1995-2014, the size of the coefficient on the institute count variable is around 0.06 for all three samples, which is less than half the size of the coefficient estimate in column (4) in Table 2. The estimated effect is significant for the larger samples in columns (2)-(3), but only imprecisely estimated in column (1). The size of the coefficient for the squared term is also about half of the size than in column (4) in Table 2 and significant in all three specifications. Table A1 Column 4-6 show the same estimations for total Swiss exports. The relationship between the number of institutes and Swiss total exports is in all three specifications larger than 0.1 and significant at least at the 5 % level.

When we split up exports into exports from the German and the non-German speaking parts of Switzerland, we see that the relationship is only due to exports from the German-speaking parts. Table 4 columns (1)-(3) present estimates with exports from the German-speaking part of Switzerland. For the two larger samples, the size of the coefficient for the number of institutes is about the same as column (4) in Table 2. For the smaller sample in column (1), it is slightly smaller and only significant at the 10 % level. These results suggest a causal effect of the number of institutes on export flows, as the number of German Goethe institutes is arguably exogenous to Swiss trade flows. However, the results in column (1) and (2) hint at heterogeneous effects for different groups of countries, which seem to be more present in the larger samples. A potential reason for this effect heterogeneity may be that German exports vary in type across importer countries, requiring lesser or greater language skills for their international trade. In the next subsection, we investigate the language skill requirement of different German export flows, and thereby also provide evidence on the importance of language for international trade and our main finding of a link between institutes and German exports. With respect to the non-German-speaking part of Switzerland, the placebo test is successful with all three samples: there is no significant positive effect of opening an institute on exports. The size of the coefficient for the number of institutes is around 25 % smaller and the estimations is much more imprecise than in the German speaking part. This is similar for the squared number of institutes.

### **4.3 Rauch product categories and the language channel**

In light of previous results by Rauch (1999) and other scholars (which we reviewed in Section 2.1), we expect that the establishment of cultural institutes and, in particular, the supply of language courses may aid international trade in general, and trade in differentiated goods in particular, as the latter require greater communication and hence language proficiency of trading parties. In this section, we test these expectations by re-estimating our main specification from column (4) in Table 4 with export flows aggregated according to the classification suggested by Rauch (1999). We are using Comtrade data reported by Germany for the longest time period available (1978-2014) that allow the conversion to Rauch-categories and balance our observations. The final sample covers 95 countries. For comparison, we also estimate aggregated exports for the same sample as in column (1) in Table 5, using, as before, the data provided by Fouquin and Hugot (2016).

Institutes that offer German courses, and institutes that do not, both can contribute to the establishment of networks and help to bridge the cultural gap between countries. Cultural institutes, such as the GI, may have a general trade-promoting effect. However, institutes that offer language courses may benefit trade with trade in communication-intensive goods even more. To explore this possibility, we modify our main specification in column (4)

in Table 2 by splitting up the total number of institutes into those which offer language services and those who do not.<sup>9</sup> This allows us, as noted, to further investigate language as the potential driver of the effect of institutes on exports. Both specifications make use of the whole set of control variables and employ PPML for estimation. As additional outcomes in this exercise, we consider exports of homogeneous goods and of differentiated goods, which represent the two 'extremes' in the classification by Rauch (1999).

Table 5: Estimation results: Rauch categories

DV: exports	(1) Aggr.	(2) Aggr.	(3) Hom.	(4) Hom.	(5) Diff.	(6) Diff.
Institutes	0.130*** (0.040)		0.057 (0.120)		0.106** (0.041)	
Institutes sq.	-0.010*** (0.002)		-0.003 (0.007)		-0.009*** (0.002)	
Lang. Institutes		0.132*** (0.051)		0.059 (0.068)		0.086** (0.042)
Lang. Institutes sq.		-0.016*** (0.005)		0.000 (0.005)		-0.012*** (0.004)
Institutes w/o lang. serv.		0.024 (0.034)		-0.005 (0.045)		0.006 (0.029)
Institutes w/o lang. serv. sq		-0.004 (0.006)		-0.003 (0.006)		-0.003 (0.005)
log GDP	0.791*** (0.053)	0.802*** (0.051)	0.664*** (0.118)	0.568*** (0.120)	0.902*** (0.054)	0.918*** (0.057)
log population	-0.369 (0.248)	-0.375 (0.255)	-0.021 (0.417)	-0.294 (0.314)	-0.347 (0.258)	-0.328 (0.268)
CU	0.383*** (0.079)	0.361*** (0.088)	0.658*** (0.122)	0.567*** (0.132)	0.283*** (0.066)	0.266*** (0.079)
FTA/EIA	0.192* (0.116)	0.202* (0.118)	0.145 (0.147)	0.108 (0.136)	0.194 (0.131)	0.213 (0.136)
GATT	0.250** (0.100)	0.288*** (0.105)	-0.255 (0.221)	-0.166 (0.213)	0.273** (0.114)	0.307** (0.124)
Import share	0.088*** (0.021)	0.090*** (0.022)	0.133 (0.081)	0.086* (0.052)	0.088*** (0.019)	0.091*** (0.021)
Constant	5.621 (3.498)	6.103* (3.614)	0.946 (6.943)	8.242 (5.320)	2.749 (3.627)	2.366 (3.937)
Observations	3,515	3,515	3,515	3,515	3,515	3,515
R-squared	0.992	0.993	0.950	0.957	0.991	0.991
Years	1978-2014	1978-2014	1978-2014	1978-2014	1978-2014	1978-2014
Countries	95	95	95	95	95	95
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Cluster-robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Similar to the previous specifications, the number of institutes have a positive but decreasing impact on overall exports also in the reduced sample with only 95 countries (see column (1)). The coefficients for the other control variables are of the expected signs and similar in size to those we obtained in earlier regressions. In column (2), we split up the number of institutes into those that offer language services (i.e., language institutes), and those who

<sup>9</sup>Column (2) in Table 5 shows results only for the reduced sample of 95 countries. In Table A2 in the Appendix, however, we show that results do not differ for the full sample of 134 countries. Because of joint reporting of two or more institutes in the annual year books, it is not clear for some of the institutes if they actually do offer language courses or not. The specification in column (1) in Table A2 assumes that only the main institute offers language services in these cases. Column 2 instead assumes that all institutes with joint reporting do offer language services. As it turns out, the results do not depend on which assumption is made. In Table 5, we report results from specifications where we assume that only the main institute offers language services.

do not. Keeping in mind that there are relatively few institutes who do not offer language services, the results show that the effect seems to be driven by language institutes, which exert a statistically significant effect. The estimated coefficient for non-language institutes, in contrast, turns out both much smaller in size and also imprecisely estimated.

Columns (3) and (4) consider exports of homogeneous goods, columns (5) and (6) exports of differentiated goods. Institutes do not appear to affect exports of homogeneous goods. The same holds true for the two subgroups of institutes with and without language-learning opportunities. Things are different for differentiated export goods. Here, institutes exert an effect similar to the one observed for overall (aggregate) exports, albeit one that is slightly smaller in magnitude. As shown in column (6), this effect is driven by institutes with language-learning opportunities. Institutes which do not offer language services do not impact the trade in differentiated goods. As was expected, therefore, and as the previous literature suggests, trade in differentiated goods benefits in particular from cultural institutes. Furthermore, our evidence shows that this effect is driven by institutes that offer language services, which suggests that language is indeed the driver behind the effect of such institutes on exports.

## **5 Conclusion**

This paper adds in several ways to the literature on cultural institutes and their impact on foreign trade. We show that language-learning opportunities (and not mere cultural services) offered by the GI abroad play an important role in export promotion. This strongly hints at language (and more specifically foreign language-acquisition) being a relevant channel for foreign trade relations.

We also find that the strength of the export-promoting effect of institutes differs across countries. The effect is more pronounced for less advanced economies, countries with a non-Germanic native language (i.e., a language that is linguistically further away from German) and countries that are not part of the same trade union as Germany.

Concerning potential reverse causality, we find that institutes abroad also have a positive impact on Swiss exports to countries hosting these institutes, although Switzerland has no say in the decision where institutes are operated. Distinguishing between exports by non-German-speaking cantons and German-speaking cantons shows that only the latter benefit from establishing institutes abroad.

Finally, and in line with the previous literature, we also find evidence for effect heterogeneity by type of export product. Using the product classification suggested by Rauch (1999), we find that institutes, and here those that offer language-learning opportunities, benefit the export of differentiated goods which require more communication for their trade. Trade in homogeneous goods, in contrast, appears unresponsive to the presence and activities of institutes.

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## Appendix

Table A1: Estimation results: German and Swiss total exports

	(1)	(2)	(3)	(4)	(5)	(6)
DV: Exports	DEU			CHE		
Institutes	0.057 (0.039)	0.062** (0.029)	0.063** (0.029)	0.103** (0.042)	0.130*** (0.039)	0.132*** (0.039)
Institutes sq.	-0.005** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	-0.008*** (0.002)	-0.010*** (0.002)	-0.010*** (0.002)
log GDP	0.726*** (0.055)	0.747*** (0.048)	0.745*** (0.048)	0.544*** (0.078)	0.582*** (0.068)	0.584*** (0.067)
log population	-0.184 (0.311)	-0.185 (0.276)	-0.185 (0.275)	0.106 (0.206)	0.024 (0.175)	0.027 (0.172)
CU = 1	0.377*** (0.077)	0.225*** (0.078)	0.224*** (0.078)			
FTA/EIA = 1	0.056 (0.074)	0.008 (0.066)	0.005 (0.066)	0.155*** (0.049)	0.143*** (0.047)	0.142*** (0.047)
GATT	0.400*** (0.090)	0.165* (0.089)	0.166* (0.089)	0.143 (0.262)	0.050 (0.137)	0.047 (0.137)
Import share	0.085*** (0.024)	0.092*** (0.027)	0.092*** (0.027)	0.126* (0.064)	0.127** (0.065)	0.128** (0.065)
Constant	3.767 (4.846)	3.493 (4.433)	1.368 (2.996)	1.422 (2.763)	1.970 (2.666)	3.274* (1.839)
Observations	2,680	3,340	3,584	2,680	3,340	3,584
R-squared	0.995	0.994	0.995	0.990	0.990	0.990
Countries	134	167	183	134	167	183
Years	1995-2014	1995-2014	1995-2014	1995-2014	1995-2014	1995-2014
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Cluster-robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A2: Estimation results: institutes with and without language services

	(1)	(2)
<b>DV: Exports</b>		
Lang. Institutes	0.136*** (0.041)	0.142*** (0.054)
Lang. Institutes sq.	-0.015*** (0.003)	-0.017*** (0.005)
Institues w/o lang. serv.	-0.034 (0.037)	0.026 (0.035)
Institues w/o lang. serv. sq	0.005 (0.007)	-0.004 (0.006)
Observations	4,958	4,958
R-squared	0.993	0.993
Countries	134	134
Years	1978-2014	1978-2014
Other controls	Yes	Yes
Year FE	Yes	Yes
Country FE	Yes	Yes

Cluster-robust standard errors in parentheses. Other controls (log GDP, log population, custom unions, FTA/EIA, GATT, import share) and constant are included, but not shown. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

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