Proximity as a Substitute of Contract Enforcement in Specialized Trade*

Luis Espinoza†, Jose Morales-Arilla‡

March 14, 2026

Abstract

We examine how geographic proximity substitutes for contract-enforcement institutions in enabling trade in specialized goods. When products require customization, successful trade depends on either strong contract enforcement or close buyer-seller relationships enabling monitoring and trust. Proximity facilitates such relationships by reducing business travel costs. Our theoretical framework predicts institutional quality primarily affects specialized trade at longer distances, where relationship-building becomes prohibitively expensive. Using bilateral product-specific export data in a gravity model, we find strong empirical support for this prediction. Consistent with our theory, business travel and passenger flights decline more sharply with distance toward destinations with weak contract enforcement institutions.

Keywords: International trade, contract enforcement, relationship-specific trade, specialized goods, gravity model, business travel.

*We thank participants in Texas A&M's Bush School Quant Bag Seminar and the Research Workshop at Tecnologico de Monterrey's Graduate School of Government for helpful comments and suggestions. All errors are our own.

†Texas A&M University. Email: lespinoza@tamu.edu

‡Tecnologico de Monterrey. Email: josemoralesarilla@tec.mx

JEL Classification: F14, F15, K12, L14

1 Introduction

The international trade literature has shown how contract enforcement institutions are key for countries to compete in "contract intensive" activities (Levchenko, 2007; Nunn, 2007). Trade in specialized goods is contract intensive because it involves the risk that providers do not meet costly idiosyncratic requirements. Importers are therefore less likely to procure such goods from countries lacking opportunities for legal recourse. Contract enforcement institutions, however, should be most relevant for specialized trade when importers are unable to find, monitor, and build trust with their suppliers. If these and other "relational" dynamics are enabled between countries that are better connected to each other, then partner proximity should work as a substitute for exporting countries' contract-enforcement institutions.

In this paper, we provide a theoretical framework and empirical evidence consistent with the view that connectivity to destination countries works as a substitute of exporters' contract enforcement institutions in determining their competitiveness in markets for specialized goods. We first introduce a stylized model of international procurement choices for specialized goods. Buyers determine how much they want to buy from a foreign provider, and then, they choose how much to spend in business travel for sustaining the relationship. Frequent travel enables providers to meet buyers' specific requirements *before* any payments are made, and the cost of travel is determined by the connectivity between both countries. Regardless of travel choice, the buyer only fully verifies whether product customization was successful or not *after* payments have been transferred. The buyer can sue for compensation in front of the provider's national courts, with chances of success being contingent on the quality of contract-enforcement institutions in the provider's country.

The framework suggests that bilateral connectivity and origin country contract-enforcement institutions should work as substitutes: Importers of specialized items may procure these goods from connected countries with bad contract enforcement institutions because private costs of travel are not prohibitive. However, the frequent travel necessary to develop

relationship-specific transactions can become prohibitively costly between distant countries, such that specialized imports become contingent on the possibility of legal recourse via good contract-enforcement institutions in the exporting country.[1] We test for this prediction by estimating a gravity model of trade on bilateral product-specific export data. Consistent with the current literature, we find that exporter contract-enforcement institutions enable trade in specialized goods at average bilateral distances. Nevertheless, consistent with our model, we find that this effect attenuates for countries closer to each other.

This substitutability is also observed when focusing on the effects of proximity on specialized trade: while distance erodes relationship-specific exports at average levels of exporter institutional quality, this negative effect attenuates as exporters' contract enforcement capabilities grow. Relatedly, because motives for travel to countries with poor institutions dwindle at longer distances, our theoretical framework also predicts that better contract enforcement capabilities in destination countries should attenuate the negative effect of bilateral distance on business travel and expenditures. We empirically confirm this prediction leveraging bilateral data on business expenditures and passenger flight frequency and capacity.

This paper contributes to the literature on institutions as a source of comparative advantage in "contract-intensive" products (Levchenko, 2007; Nunn, 2007; Nunn and Trefler, 2014). The standard framework predicts that countries with poor formal institutions should be locked out of specialized economic activities. By adding the bilateral dimension of trade to our theoretical and empirical framework, we offer a refined understanding about the role of formal institutions as an enabler of specialized trade whenever connectivity costs prevent relational dynamics between trading partners. Indeed, our empirical analyses confirm that poor contract-enforcement institutions erode exports of specialized goods *at average distances* between country pairs. But far from being unable to compete in specialized markets, institutionally underdeveloped countries can still engage in relationship-specific transactions with nearby partners with whom relational dynamics

can be sustained affordably.

In our theoretical framework, the importance of relational contracting (Macaulay, 1963; Baker et al., 2002) as an alternative to formal enforcement has to do with the moral hazard and hold-up problems that commonly arise in the presence of incomplete contracts (Klein et al., 1978; Holmström, 1979, 1982; Holmström and Milgrom, 1991; Hart and Moore, 1999). A few studies focusing on developing-country case studies have delved into the importance of relational contracting in international trade (McMillan and Woodruff, 1999; Macchiavello, 2022; Cajal-Grossi et al., 2023). Other studies focusing on bilateral trade patterns have documented the importance of geographic proximity for developing specialized products with few substitutes, emphasizing the relative importance of search costs and information barriers in these specific products (Rauch, 1999; Chaney, 2008). Our empirical finding that bilateral proximity erodes the relevance of domestic institutions for competing in specialized markets suggests that, beyond search costs, proximity allows partners to develop credible commitments that are required to sustain relationship-specific transactions in the absence of formal enforcement alternatives.

A separate strain of the literature has considered how connectivity costs erode trade by inhibiting business travel (Cristea, 2011; Blonigen and Cristea, 2015; Donaldson and Hornbeck, 2016; Donaldson, 2018; Söderlund, 2020; Wang et al., 2021; Söderlund, 2023; Cristea, 2023; Ho et al., 2024; Morales-Arilla and Bustos, 2024). Our theoretical framework and empirical results highlight the role of the business travel in enabling specialized exports from institutionally underdeveloped countries. Finally, there is a long-standing literature on the institutional alternatives for developing economies to make credible commitments despite weak domestic contract enforcement capabilities (World Bank, 1992; Schmitz and Nadvi, 1999; Madani, 1999; UNCTAD, 2015; Cirera and Lakshman, 2014; Yap, 2004; Rodrik, 1991; Rodrik and Subramanian, 2004; DeLong, 2003; Haftel, 2007; Copelovitch and Ohls, 2012). Consistent with the relational contracting rationale, many historical and modern examples emphasize the importance of informal networks in overcoming commitment problems (Greif et al., 1994; Greif, 2006; Maxfield and Schneider,

1997; Sen, 2013; Roy et al., 2014).

To our knowledge, this is the first paper to show how geographic proximity substitutes for contract enforcement institutions in enabling exporting countries to compete in relationship-specific markets, showing complementary evidence of increased business travel over short distances towards destinations with poor contract-enforcement institutions. We interpret our findings as driven by the enhanced possibility of developing transparent business relationships over short distances. From this perspective, remote economies may need to develop their formal contract-enforcement institutions in order to compete in specialized markets. Similarly, initiatives that reduce exporters' connectivity costs may have disproportionate returns for the development of specialized industries in countries with underdeveloped contract enforcement institutions.

The paper continues as follows: Section 2 introduces our theoretical framework. Section 3 presents our data and empirical strategy. Section 4 discusses our results on bilateral trade of specialized goods, bilateral business travel and air connectivity. Section 5 concludes.

2 Theoretical Framework Outline

In this section, we outline the logic and conclusions of a dynamic model of relational contracting in international trade that clarifies how the affordability of bilateral business travel may substitute for contract enforcement institutions in specialized trade. The focus is on an ongoing relationship between a buyer and a foreign supplier of an intermediate good that needs to be customized to the buyer's specific requirements. While the rest of this section outlines the model's assumptions and testable predictions, we provide a detailed description and solution of the model in Appendix A.1.

2.1 Dynamic model of trade and contracting frictions

We consider an infinite-horizon setting in which a buyer located in country d seeks to procure specialized intermediate goods from suppliers located in country o. Time is

discrete, and both parties discount future payoffs at rate $\beta \in (0, 1)$. The buyer must first find a suitable supplier, and then the matched pair engages in repeated transactions for as long as the relationship is sustained.

2.1.1 Supplier types and matching

suppliers are heterogeneous in their propensity to honor contractual commitments. A fraction of suppliers are "good types" who always deliver the customized product as specified. The remaining suppliers are "bad types" who may shirk on their contractual obligations—delivering a non-customized product—if it is economically advantageous to do so. The supplier's type is private information, unknown to the buyer at the time of initial engagement. θ stands for the share of good types in the origin country.

After a buyer find a supplier, whether they will be shirked upon will depend on whether they travel to the supplier's country. Travel facilitates successful customization by enabling the screening of potential suppliers, the provision of technical assistance, the direct monitoring of supplier operations, and the development of informal communication channels that sustain relational contracting (Macaulay, 1963; Baker et al., 2002). From the perspective of the model, if the buyer travels to the origin country, they prevent potential bad types from shirking. This benefit captures the central mechanism through which travel facilitates relational contracting.

2.1.2 Customization and payoffs

We make the following assumptions regarding the customization process. First, a product can only be "fully customized" or "not customized at all"—we do not allow for partial customization. Second, the supplier fully controls whether the product is customized or not. Third, customizing a product is more costly than not customizing it.

If a matched supplier honors the contract and delivers the customized product, both parties receive a surplus, and the relationship continues indefinitely, yielding the same payoffs per period into the future. If the supplier shirks, the buyer incurs a loss, the

relationship terminates, and the buyer must search for a new supplier in subsequent periods. The incentive for opportunistic behavior by the supplier arises because payment is transferred upon delivery but before the buyer has had enough time to assess whether the product was fully customized. A shirking supplier receives a one-time gain that captures the benefit from avoiding customization costs and potential misappropriation.

2.1.3 Contract enforcement institutions

When a supplier shirks, the buyer's recourse is to seek compensation through the supplier's national legal system. We model the quality of contract enforcement institutions in country o as a parameter $\mu \in [0, 1]$ that determines the extent to which shirking is penalized and victims are compensated. When $\mu = 1$, institutions are perfect: shirking suppliers lose all gains and defrauded buyers are fully compensated. When $\mu = 0$, there is no institutional enforcement: shirking suppliers keep their gains and buyers bear full losses.

Why national institutions? Domestic contract enforcement may play only a minor role in international transactions given the availability of international institutions that private parties can rely upon. First, contracts can specify a Choice of Law clause, where parties can opt for the law of any country (even a third one). Second, contracts can specify a Choice of Forum clause, where parties can agree on the jurisdiction that would resolve potential disputes (including a third country). Third, the parties could opt to resolve their dispute by arbitration instead of using the courts. Fourth, even when relying on national courts, contract law has been standardized across countries via initiatives such as the New York Convention of 1958 or the Vienna Convention of 1980. These four characteristics should diminish the effect that country differences in institutional quality have on cross-border transactions. However, these tools only affect the dispute resolution, not its compliance. If the losing party chooses to ignore the ruling, compliance can only be enforced by judicial execution organs in locations where that party has assets. Therefore, we should still expect national institutions to affect international transactions (Berkowitz et al., 2004, 2006).

Why the exporter's institutions? There is an asymmetry between the risks that buyers and sellers face in international transactions. Exporters face the risk of not being paid by the importer, but they have at their disposal old tried-and-true tools to reduce this risk, such as prepayment, bills of exchange, or letters of credit. In contrast, importers face the risk of getting defective or, as in our model, "not fully customized" goods. Mitigation of this type of risk requires hiring inspection and testing agents, who may not even be able to test every important specification, or be able to do so in a timely manner. This risk asymmetry has two implications. First, the importer may care more than the exporter about the quality of contract enforcement institutions. Second, if the exporter were to lose a legal dispute, unless it voluntarily abides by the ruling, compliance can only be coerced in a country where it has assets, which is most likely its home country. Hence, exporter contract enforcement institutions are the most likely to influence international transactions (Berkowitz et al., 2004, 2006).

2.1.4 Equilibrium regimes

The interaction between institutional quality and relational incentives generates a threshold level of institutional quality, μ^*, that determines equilibrium behavior. When $\mu \geq \mu^*$, formal enforcement is sufficient to deter shirking by all supplier types. In this "pooling" equilibrium, buyers know they will not be cheated regardless of supplier type, so travel provides no additional benefit and buyers optimally choose not to travel.

When $\mu < \mu^*$, institutions are too weak to deter shirking by bad-type suppliers, and the buyer faces genuine risk of being matched with a shirking partner. In this regime, travel becomes potentially valuable because it prevents shirking. The buyer's travel decision then depends on whether the benefits justify the travel cost B, which we assume is increasing in the bilateral distance between countries.

2.2 Travel as a relational investment

We extend the standard framework by giving buyers an additional tool: the ability to travel to the supplier's country to screen and monitor their partners.

Because business travel is costly, the buyer faces a trade-off. We assume that travel costs increase with the distance between the two countries. In equilibrium, buyers travel when the expected benefit from improved matching exceeds the cost. Formally, the buyer travels if and only if the cost of business travel $B < B^*$, where the threshold B^* is decreasing in institutional quality μ. Better institutions reduce the value of travel because improved compensation prospects make the supplier-type distinction less consequential.

The buyer engages in trade only if the expected value of the trading relationship exceeds the outside option L. In the appendix, we show that if this condition is satisfied under strong institutions ($\mu \geq \mu^*$), then it is also satisfied under weak institutions as long as travel costs are sufficiently low (i.e., the bilateral distance be sufficiently short). We also show that this result is contingent on the value of the trading relationship. Highly valuable opportunities (higher than the second threshold $B^*(0)$) always occur regardless of travel costs. In this scenario, if travel is too expensive, trade takes place without relational investment.

2.3 Empirical predictions

The model generates predictions consistent with the established result that, *ceteris paribus*, trade in specialized goods is increasing in the quality of contract enforcement institutions in the exporting country (Nunn, 2007; Levchenko, 2007). However, we add an additional layer of nuance: the magnitude of this relationship depends on the distance between the two countries.

This is the *institutions-proximity substitutability* prediction: Institutions are disproportionately relevant for specialized trade between distant partners for whom travel-based relational contracting is prohibitively expensive. At short distances, buyers can afford to

travel, enabling them to find reliable partners and sustain relational contracts even when formal institutions are weak. At long distances, travel becomes too costly, and trade in specialized goods requires strong formal institutions to deter opportunistic behavior.

Similarly, connectivity costs are disproportionately relevant for specialized exports from countries with poor contract enforcement institutions. When institutions are strong, bad-type suppliers do not shirk regardless of whether the buyer travels, so distance affects trade only through standard channels like transport costs, which affect both specialized and non-specialized goods. When institutions are weak, distance additionally determines whether buyers can invest in the relational mechanisms that substitute for formal enforcement.

Relatedly, the model predicts non-linear effects of proximity and contract enforcement institutions for the intensity of bilateral business travel between country pairs: Proximity will have a disproportionate effect on travel toward countries with poor contract-enforcement institutions because buyers traveling to such destinations do so specifically to screen, monitor and build relationships with suppliers so as to compensate for weak formal institutions. Travel to destinations with strong institutions is less sensitive to distance because it serves other purposes unrelated to contract enforcement. Table 1 provides a stylized summary of the key model predictions.

Table 1: Stylized summary of model predictions

	Good exporter rule of law	Bad exporter rule of law
High bilateral distance	No erosion of RS trade No travel	Erosion of RS trade No travel
Low bilateral distance	No erosion of RS trade No travel	No erosion of RS trade Travel

Note: Table summarizes key model predictions about relationship specific trade and relational travel choices at different combinations of exporter country institutional quality and bilateral distance between exporters and importers.

3 Data and Empirical Strategy

Data

Trade flows. We use bilateral trade flow at the product level for 2015.[2] Our source for this data is *Base pour l'Analyse du Commerce International* (BACI) (Gaulier and Zignago, 2010), a dataset maintained and made publicly available by the *Centre d'études prospectives et d'informations internationales* (CEPII) on its website.[3] BACI is updated yearly, and its multiple versions are identified by the year and month of its release. We use the version of January 2025. In BACI, a "product" is defined as a subheading (a six digit code) in Harmonized System (HS), a standard system for classifying goods used by most custom authorities. Since its creation in 1988, the HS has been revised six times, and each revision is identified by the year of its introduction. We use HS revision 2012.

Sector classification. We group products (defined as in BACI) in 21 "sectors", each corresponding to one of the "sections" in HS revision 2012 is organized. The five most important sectors with respect to trade value are "Machinery and electrical equipment; electronics" (20%), "Mineral products" (15%), "Chemical products" (11%), "Transport equipment" (9%), and "Base metals and metal products" (8%).

Product classification. The identification of products in BACI as "final", "specific", or "generic" is based on the fifth revision of Broad Economic Categories (BEC) from 2016. In this revision, products are defined in the same way as in BACI (a six digit code in the HS 2012 revision), making these datasets compatible. BEC provides a high-level aggregation of products that is structured in six levels, called "dimensions". We classified products based on the third, fourth and fifth dimensions. The third dimension classifies products according to their end use as (1) "intermediate consumption", (2) "gross fixed capital formation", and (3) "final consumption"; the fourth dimension classifies products according to their processing as (1) "primary" or (2) "processed"; and the fifth dimension classifies products as (1) "generic" or (2) "specific". Some products have dual classifications, which was addressed by reclassifying based on their main category.

We create one variable that labels trade flows according to the characteristics of the good being traded. We consider goods simultaneously classified by BEC as "intermediate", "processed" and "specific" as the empirical equivalent of specialized goods in the model. All other goods are considered non-specialized, except for "gross fixed capital formation" (capital) goods, which are dropped from the sample because their end-use cannot be unambiguously established as either final or intermediate and because their trade is most likely based on dynamic decisions that are not addressed in our model. We then split the the non-specialized category, distinguishing between "final goods" and the remaining non-specialized intermediate goods. We call this variable *product type* and use it to index trade flows[4]

Table A.1 summarizes the distribution of products and trade value according to the final categories. Most trade is evenly distributed between final goods (29.0%), generic intermediate goods (27.5%) and specialized intermediate goods (27.7%), and the remaining 15.8% being capital goods that are not included in the final sample.

Institutional quality. We used two variables to proxy for the quality of contract enforcement institutions. The measure we use in the main text is based on the "Rule of Law" index from the Worldwide Governance Indicators (WGI) database, Kaufmann and Kraay (2022). This is a perception-based indicator based "on several hundred variables obtained from 31 different data sources", and it is meant to reflect the opinions of survey respondents, non-governmental organizations, commercial businesses and the public sector[5]. Most countries (202 out of 227) have information on this variable, representing 99.97% of the global value traded in 2015. As a robustness check, we also use the measure "Rule of Law" index from the Varieties of Democracy (V-Dem) Project (Coppedge et al., 2020). This index takes values from 0 (low) to 1 (high) reflecting the answer to the question "To what extent are laws transparently, independently, predictably, impartially, and equally enforced, and to what extent do the actions of government officials comply with the law?". Although less than WGI, most countries (175 out of 227) have information on this variable, representing 74.09% of the global value traded in 2015. Finally, be-

cause institutional quality may be endogenous to trade, we instrument it with countries' legal origins, which we define as a binary variable on whether exporter countries have Scandinavian, German or British legal origins or not.[6]

Business travel, passenger flights, country networks, financial development and financial dependence. We consider a bilateral index of business travel spending for 2015 from Coscia et al. (2020). This index captures the intensity of use of corporate credit cards originated in one country for purchases located in a different country. Moreover, we take information about the total number of passenger flights operating between different country pairs and their aggregate capacity in 2015 from OAG (2025). Finally, we consider the networks connecting different country pairs. We take bilateral distances from Conte et al. (2022). Data on the cultural, historical, political and genetic links between countries come from Spolaore and Wacziarg (2018) and Pellegrino et al. (2025). Following Nunn (2007), we measure financial development of countries as the ratio of credit to the private sector as a share of GDP. Finally, we take industry-level measures of financial dependence from Rajan and Zingales (1998).[7] Table A.2 provides summary statistics for the main variables considered in the analyses below.

Empirical strategy

Specification. Our starting point is the standard sectoral gravity equation (Chaney, 2008; Costinot et al., 2011; Caliendo and Parro, 2014), which we expand to include a term that captures the effect of contract enforcement institutions on trade in specialized goods (Levchenko, 2007; Nunn, 2007; Berkowitz et al., 2004, 2006). We expand this expression once more by adding two terms that capture the additional effect that distance can have on the trade flows of specialized goods (Chaney, 2008; Rauch, 1999), and the substitutability between distance and institutions, respectively.

Our data allows us to control for several unobservable regressors systematically using different combinations of fixed effects. All our specifications share the same basic structure presented in the previous paragraph, but differ in their fixed effects and thus in the

number of coefficients that can be identified with the remaining variation in the data. Our least strict specification only includes exporter-sector and importer-sector-product type fixed effects, which allows us to estimate the complete set of coefficients of interest:

$$\begin{aligned}\text{Trade}_{odst} = \exp\Big\{ & \underbrace{\beta_D \log(\text{Dist}_{od}) + \boldsymbol{\gamma_1'} \boldsymbol{C_{od}}}_{\text{bilateral effects (all goods)}} + \underbrace{\beta_E \big(S_t \times \text{CE}_o\big)}_{\text{institutions (specific goods)}} \\ & + \underbrace{\beta_{DS}\Big(\log(\text{Dist}_{od}) \times S_t\Big) + \big(\boldsymbol{\gamma_2'} \boldsymbol{C_{od}} \times S_t\big)}_{\text{search costs (specific goods)}} \\ & + \underbrace{\beta_{ED}\Big(\log(\text{Dist}_{od}) \times S_t \times \text{CE}_o\Big) + \big(\boldsymbol{\gamma_3'} \boldsymbol{C_{od}} \times S_t \times \text{CE}_o\big)}_{\text{substitution effects (specific goods)}} \\ & + \phi_{os} + \phi_{dst}\Big\} + \varepsilon_{odst} \end{aligned} \tag{1}$$

where $\text{Trade}_{odst} \geq 0$ is the value of exports from origin country o to destination country d of products in sector s that are of type t; $\log(\text{Dist}_{od}) \geq 0$ is the logarithm of the bilateral distance between o and d[8]; $\text{CE}_o \in [0, 1]$ is either the measure of the contract enforcement institutional quality of country o, or its binary marker for legal origins associated with better contract-enforcement institutions; $S_t \in \{0, 1\}$ is an indicator variable for specialized product types within each sector s; $\boldsymbol{C_{od}}$ is a column vector with a set of bilateral controls capturing geographical contiguity as well as the historical, cultural and genetic ties between country pairs; ϕ_{os} and ϕ_{dst} are origin-sector and destination-sector-product type fixed effects; and ε_{odst} is an error term.

Given our focus on the substitutability between contract enforcement institutions and proximity, we mostly care about correctly estimating β_{ED}. Our most strict specification includes exporter-sector-product type, importer-sector-product type and exporter-importer fixed effects that absorb most of the regressors in Equation 1, but leaves enough

variation to estimate β_{DS}, β_{ED} and other controls:

$$\begin{aligned}\text{Trade}_{odst} = \exp\Big\{ & \underbrace{\beta_{DS}\Big(\log\left(\text{Dist}_{od}\right) \times S_t\Big) + \left(\boldsymbol{\gamma_2'} \boldsymbol{C_{od}} \times S_t\right)}_{\text{search costs (specific goods)}} \\ & + \underbrace{\beta_{ED}\Big(\log\left(\text{Dist}_{od}\right) \times S_t \times \text{CE}_o\Big) + \left(\boldsymbol{\gamma_3'} \boldsymbol{C_{od}} \times S_t \times \text{CE}_o\right)}_{\text{substitution effects (specific goods)}} \\ & + \phi_{od} + \phi_{ost} + \phi_{dst}\Big\} + \varepsilon_{odst} \end{aligned} \tag{2}$$

where ϕ_{od} and ϕ_{ost} are origin-destination and origin-sector-product type fixed effects, respectively.

The specification for business travel and passenger flights is similar to those for trade, except that we no longer have variation across sectors and product type. This leaves us with only one feasible specification, akin to the aggregate gravity equations:

$$\begin{aligned}\text{Travel}_{od} = \exp\Big\{ & \underbrace{\beta_D \log\left(\text{Dist}_{od}\right) + \boldsymbol{\gamma_1'} \boldsymbol{C_{od}}}_{\text{bilateral effects}} + \underbrace{\beta_{ED}\Big(\log\left(\text{Dist}_{od}\right) \times \text{CE}_d\Big) + \left(\boldsymbol{\gamma_2'} \boldsymbol{C_{od}} \times \text{CE}_d\right)}_{\text{substitution effects}} \\ & + \phi_o + \phi_d\Big\} + \varepsilon_{od} \end{aligned} \tag{3}$$

Where Travel_{od} is the bilateral business travel / passenger flights outcome, ϕ_o and ϕ_d capture origin fixed effects and destination fixed effects, and ϵ_{od} is a bilateral error term[9]. In this specification, β_D captures the effect of distance on travel for destination countries with the lowest contract enforcement institutions ($\text{CE}_d = 0$), while β_{ED} captures how the effect of distance on bilateral travel changes as contracting institutions in travel destinations improve.

Estimation Method. We use Poisson Pseudo-Maximum Likelihood (PPML) to estimate the parameters of the gravity models of both bilateral trade and travel. In all cases, standard errors are estimated by allowing error correlation within origin-destination blocks.

Causal identification. The main threat to causal identification is reverse causality, as trade flows may influence institutional quality if agents face greater incentives to develop and maintain good institutions in countries specialized in the production of customized goods. This issue is addressed with "reduced-form" specifications substituting our measure of institutional quality by a plausible instrument. Following (Nunn, 2007), we consider countries' historical legal origins, which are taken from Conte et al. (2022).

4 Results

Effects on Specialized Trade

Panel A of Table 2 provides results from estimating variations of equations 1 and 2. Column 1 estimates equation 1 and confirms the patterns established in Nunn (2007) and Levchenko (2007): better contract enforcement institutions are associated with more trade for specific goods. Column 2 incorporates a country-pair fixed effect absorbing the independent effect of bilateral distance, and conclusions from Column 1 remain unchanged. Column 3 adds the interaction term between relationship specific product types, the quality of contract enforcement institutions in the exporting country and the log of bilateral distance. We now see that the effects of improved institutions are counterintuitive for countries at no distance from each other, while the effects of distance are in line with the expectations from Rauch (1999) and Chaney (2008) for exporting countries with the worst possible contract-enforcement institutions. Chiefly, we see a positive and statistically significant interaction term, suggesting that contract-enforcement institutions and geographic proximity (the inverse of distance) work as substitutes: At longer distances, the positive role of contract enforcement institutions for relationship-specific exports starts to show up. Similarly, the positive role of geographic proximity on specialized exports starts to disappear for exporters with better contract enforcement institutions. We confirm these patterns in Column 4 after adding origin-sector-product type fixed effects into our specification - while absorbing the relative effect of contract-enforcement institutions on specialized goods between countries at no distance from each

other, we continue to see the positive and significant interaction term, confirming how exporter contract-enforcement and geographic proximity work as substitutes in enabling relationship-specific trade. Panel B of Table 2 replicates this sequence of specifications using our binary marker for exporter countries with legal origins associated with better contract enforcement institutions.[10] We confirm a positive and significant estimate of the interaction term added in Columns 3 and 4, emphasizing how the positive effects of contract enforcement institutions on relationship-specific exports show up only at sufficiently long bilateral distances.

Table 2: Bilateral trade regressions, year 2015

Dependent variable:	Bilateral trade flows by sector and product type			
	(1)	(2)	(3)	(4)
Panel A. Using CE: exporters' contract enforcement quality.				
Log distance	-1.033***			
	(0.024)			
Specific × CE exporter	0.872***	0.667***	-4.540***	
	(0.140)	(0.116)	(0.705)	
Specific × Log distance	0.162***	0.097***	-0.439***	-0.363***
	(0.036)	(0.032)	(0.076)	(0.063)
Specific × CE exporter × Log distance			0.699***	0.668***
			(0.088)	(0.077)
No. observations	1,294,184	1,294,184	1,294,184	1,294,184
No. clusters	25,421	25,421	25,421	25,421
Panel B. Using LO: exporters' legal origin binary marker.				
Log distance	-1.027***			
	(0.024)			
Specific × LO exporter	0.293***	0.268***	-1.169***	
	(0.050)	(0.042)	(0.287)	
Specific × Log distance	0.148***	0.082***	-0.033	0.077***
	(0.034)	(0.030)	(0.032)	(0.021)
Specific × LO exporter × Log distance			0.192***	0.132***
			(0.037)	(0.031)
Exporter-sector FE	X	X	X	
Exporter-sector-product type FE				X
Importer-sector-product type FE	X	X	X	X
Country pair FE		X	X	X
No. observations	1,271,017	1,271,017	1,271,017	1,271,017
No. clusters	24,961	24,961	24,961	24,961
Pseudo R^2	0.892	0.932	0.932	0.953

Note: Clustered standard errors by country pair in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01. **Specific** is a binary variable equal to one if the traded product is a *relationship-specific* intermediate good, and zero otherwise (i.e., for generic intermediate goods and all final goods; capital goods are excluded from the sample). **CE exporter** is a proxy for the quality of *contract enforcement* institutions in the exporting country. **LO exporter** is a binary variable equal to one if the exporter's legal origin is British common law, Scandinavian civil law or German civil law, and zero otherwise (i.e., French civil law or Socialist). All regressions include controls for common language, genetic distance, common colonial history, and common legal origins -all interacted with the Specific dummy. Columns 3 and 4 also include triple interactions between the Specific dummy, contract enforcement quality (or legal origins dummy), and the respective bilateral controls. All regressions were estimated using the module for Poisson pseudo-maximum-likelihood with multiple levels of fixed effects `ppmlhdfe` of Correia et al. (2020) in Stata BE, version 19.5.

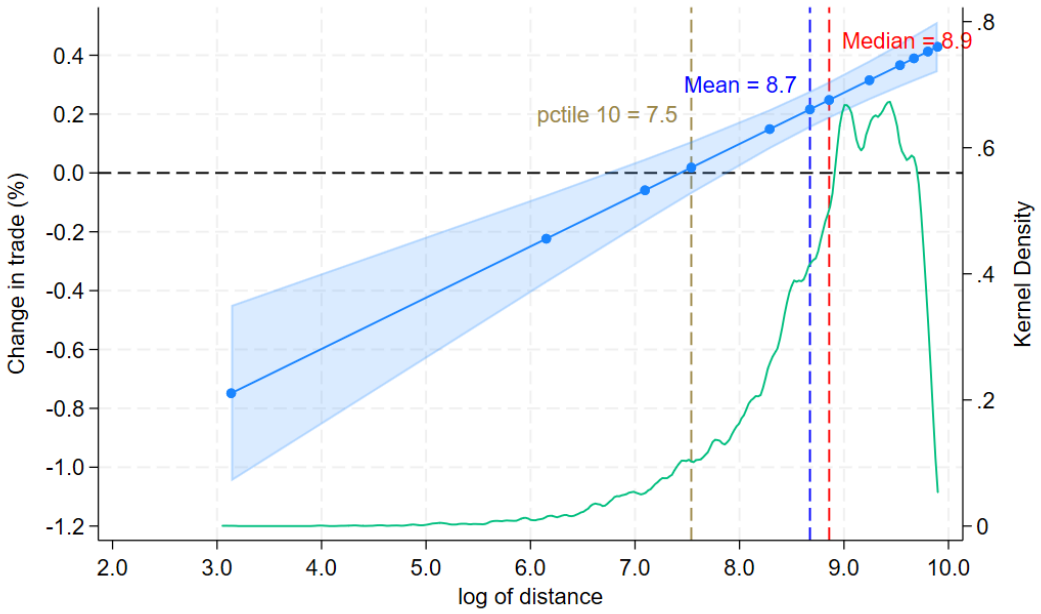
Given that triple interaction terms can be difficult to interpret, we complement the results in Table 2 with graphical representations of the average marginal effects (AME) of institutional quality and distance in Figure 1. Since all of our specifications include fixed effects, it is important to explicitly connect our interpretation with the underlying identification assumptions. In Panel A, we plot the semi-elasticity of relationship-specific trade with respect to institutional quality as a function of log distance[11]:

$$\frac{\partial \log \mathbb{E}\left[\text{Trade}_{odst} | S_t = 1, \log\left(\text{Dist}_{od}\right)\right]}{\partial \text{CE}_o} = \beta_E + \beta_{ED} \log\left(\text{Dist}_{od}\right) + \boldsymbol{\gamma_3'} \mathbb{E}\left[\boldsymbol{C_{od}} | \boldsymbol{S_t = 1, \log\left(\text{Dist}_{od}\right)}\right]$$

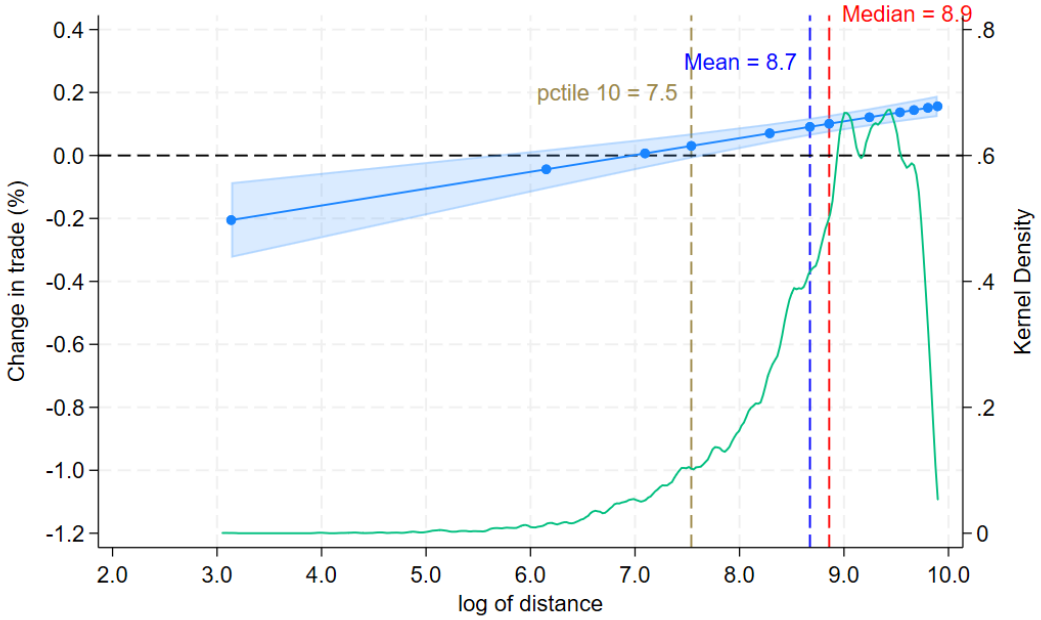
Since institutional quality is a country-level (exporter) variable and our specification includes an exporter-sector fixed effect (ϕ_{os}), our interpretation is correct only if institutional quality does not affect trade in non-specific goods ($d\phi_{os}/d\text{CE}_o = 0$). We find that improved institutions enhance relationship-specific trade at the average and median distances between all country pairs. However, this effect becomes statistically insignificant for the 10% of country pairs that are closest to each other. Panel B of Figure 1 provides estimates focusing on the effects of our binary marker for exporter legal origins at different bilateral distances. Same as above, while the effect of legal origins associated with good contract-enforcement institutions on specialized exports are positive at average and median bilateral distances between exporters and importers, these effects become insignificant for countries at short distances from each other.

Figure 1: Marginal effect (%) of institutions on trade in specific goods

(a) Institutional quality (unit increase)



(b) Legal origins (British common law or Scandinavian civil law effect)



Note: Marginal effects estimated based on results reported on Column 3 of Panels A and B of Table 2. Panel A shows the average marginal semi-elasticity with respect to exporter's institutional quality plotted at different log distances between country pairs. Panel B shows the same semi-elasticity with respect to exporter's legal origin. The panels also show the kernel density of log distance.

We conduct several robustness checks to validate our main findings (see Section A.2 in the Appendix for details). First, we estimate our key specifications separately for years 2012, 2015, 2018, 2021, and 2023. Figure A.3 shows remarkably stable coefficients across all years. Importantly, the substitutability effect remains positive and significant even in the post-pandemic period (2021 and 2023), suggesting that the shift to digital communication tools has not eliminated the need for face-to-face interaction in relational specialized production. Moreover, Table A.3 performs a joint specification with data for all these years, confirming our main conclusions. Second, Table A.4 confirms our results using an alternative measure of institutional quality from the Varieties of Democracy dataset (Coppedge et al., 2020), and shows that our findings persist after controlling for countries' financial development and products' dependence on external finance following Nunn (2007). While these financial factors attenuate our estimates somewhat, the core substitutability between proximity and institutions remains statistically significant. Finally, Table A.5 shows that controlling for time zone differences between country pairs does not meaningfully affect our results, providing evidence against the alternative explanation that virtual connectivity rather than physical proximity drives our findings.

Effects on Business Travel and Air Connectivity

One of the empirical predictions discussed above is that we should observe more business travel over short distances towards countries with poor contract enforcement institutions for the motive of oversight in relationship-specific activities aimed at supplying clients with specialized inputs. Table 3 provides estimates from the specification described in Equation 3. Columns 1-2 focus on the effects of bilateral distance on the bilateral business travel index introduced in Coscia et al. (2020), while Columns 3-4 focus on the number of bilateral passenger flights and Columns 5-6 focus on the number of available passenger seats in those flights. As expected, Columns 1, 3 and 5 suggest that higher distances reduce business travel and air connectivity. However, Columns 2, 4 and 6 suggest that proximity is most important for business travel and air connectivity among destinations with poor contract-enforcement institutions, as the negative effect of distance seems to

attenuate with improved contract enforcement institutions.

Table 3: Bilateral travel regressions, year 2015

Dependent variable:	Bilateral business expenditure flows		Bilateral passenger frequency		Bilateral passenger capacity	
	(1)	(2)	(3)	(4)	(5)	(6)
Log distance	-0.846***	-1.379***	-1.266***	-1.878***	-1.058***	-1.755***
	(0.070)	(0.135)	(0.075)	(0.180)	(0.071)	(0.185)
CE exporter × Log distance		0.645***		0.812***		0.923***
		(0.178)		(0.231)		(0.236)
pseudo R^2	0.341	0.342	0.884	0.889	0.874	0.880
Observations	6,516	6,516	34,225	34,225	34,225	34,225
Origin FE	X	X	X	X	X	X
Destination FE	X	X	X	X	X	X
Nbr. clusters	107	107	185	185	185	185

Note: Clustered standard errors by exporter and importer in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01. **CE exporter** is a proxy for the quality of contract enforcement institutions in the exporting country (travel destination). All regressions include controls for common language, genetic distance, common colonial history, and common legal origins. Specifications (2), (4) and (6) also include interactions between contract enforcement quality (or legal origins dummy) and the respective bilateral controls. All regressions were estimated using the module for Poisson pseudo-maximum-likelihood with multiple levels of fixed effects `ppmlhdfe` of Correia et al. (2020) in Stata BE, version 19.5.

5 Conclusion

This paper examines how geographic proximity can substitute for weak contract enforcement institutions in enabling developing countries to compete in markets for specialized goods. We develop a theoretical framework showing that when buyers can supervise or build trust with their foreign suppliers through cost-effective travel, the need for strong formal contract enforcement in exporting countries diminishes. Our empirical analysis of bilateral trade data confirms this substitutability: while contract enforcement institutions matter for specialized exports at average distances, their importance attenuates significantly for proximate trading partners.

Our findings challenge the conventional wisdom that countries with weak institutions are locked out of contract-intensive production. Instead, we show that institutionally underdeveloped countries can successfully engage in specialized trade with nearby partners, as proximity makes supervision and relational contracting feasible. The complementary evidence on business travel patterns reinforces this mechanism — we find that the effect of bilateral distance on business travel and air connectivity is steeper for travel destinations with weaker contract enforcement institutions. The finding that business travel to destinations with poor contract enforcement is disproportionately concentrated at short distances is consistent with the view that buyers invest in direct in-person relationships with proximate trading partners as a substitute for legal recourse.

By revealing how geography and institutions interact in shaping comparative advantage, this paper underscores that the path to competing in specialized markets need not be identical for all developing countries. Recognizing these interactions highlights the role of geography and connectivity in prioritizing export promotion strategies. For remote developing countries, improving formal contract enforcement institutions remains crucial for accessing specialized export markets. Similarly, returns to investments in connectivity infrastructure — such as improved air links, streamlined visa processes, and reduced travel costs — may yield their highest returns in countries with poor contract-enforcement institutions. Given modern technological advances, future research could explore how the

virtual supervision of production processes can affect the proximity-institution trade-off, as it may reduce the importance of physical distance in enabling transparent trade in specialized goods.

Notes

[1]Mexico provides an illustrative example consistent with this prediction: Contrary to the general predictions of Levchenko (2007) and Nunn (2007), Mexico exports specialized goods -mainly to the United States- despite having subpar contract-enforcement institutions.

[2]Our main analyses focus on bilateral product specific trade for 2015 for comparability reasons, as our later analyses leverage data on business travel spending and direct flights for that year. In the appendix, we present a diverse set of robustness checks to show that the conclusions of our analyses are not contingent to trading relationships from this specific year.

[3]The information in BACI is based on the official trade data reported by countries to the United Nations, which is disseminated via their Commodities Trade Statistics (COMTRADE) database. Since countries report both their imports and exports to the United Nations, bilateral trade flows are likely to be reported twice in the raw data, and although these reported values should match, in practice they do not. Thus, CEPII implements a harmonization procedure to reconcile mismatched duplicate trade flows into a single figure. BACI is the result of this process.

[4]To economize on computing time, we reduce the number of observations in our dataset by aggregating the bilateral trade data from product-level to sector and product type.

[5]The original index is not bounded between 0 and 1, so we normalized it.

[6]Nunn (2007) uses a categorical variable for the legal origin of countries as an instrument for the quality of their contract-enforcement institutions. Because we will evaluate the interaction of origin institutions and bilateral distance, we will consider a binary transformation of this categorical variable, assigning a value of 1 to the three legal origins associated with the highest average institutional quality scores: Scandinavian, German or British, as opposed to either French or Socialist legal origins.

[7]Rajan and Zingales (1998) measure industries' dependence on external finance as the difference between capital expenditures minus the cash flow from operations, divided by capital expenditures. We take a measure of financial dependence at the 4-digit level of the HS12 Product Classification from Gorrín et al. (2023). We produce an average of these measures at the product section-product type level, weighing 4-digit products within the same category by their relative size in 2015 World trade.

[8]Although the log function can take negative values for distances less than one, the minimum distance in our dataset is 21 kilometers.

[9]Note that the country of origin in the business travel equation corresponds to the country of destination in the trade equation.

[10]A potential concern about the results reported in Panel A of Table 2 is that the quality of contract-enforcement institutions may be endogenous to trade dynamics. Because of the lack of readily available tools for estimating high-dimensional PPML models considering instrumental variables, Panel B of Table 2 provides a "reduced-form" version of our analysis. Similar to Nunn (2007), the exclusion assumption in this context means that exporter legal origins do not affect specialized trade outcomes through any mechanism other than institutional quality.

[11]We used the minimum, maximum, mean and percentiles 1, 5, 10, 25, 50, 75, 90, 95 and 99 of the log distance distribution in the data. We also plotted the (kernel) density function of log distance to help in the interpretation of results.

References

Baker, George, Robert Gibbons, and Kevin J Murphy, "Relational contracts and the theory of the firm," *The Quarterly Journal of Economics*, 2002, *117* (1), 39–84.

Berkowitz, Daniel, Johannes Moenius, and Katharina Pistor, "Legal Institutions and International Trade Flows," *Michigan Journal of International Law*, 2004, *26* (1), 163–198.

_ , _ , and _ , "Trade, Law, and Product Complexity," *The Review of Economics and Statistics*, 2006, *88* (2), 363–373.

Blonigen, Bruce A and Anca D Cristea, "Air service and urban growth: Evidence from a quasi-natural policy experiment," *Journal of Urban Economics*, 2015, *86*, 128–146.

Cajal-Grossi, Julia, Rocco Macchiavello, and Guillermo Noguera, "International buyers, trade and management practices: Evidence from Bangladesh," Technical Report, Working Paper 2023.

Caliendo, Lorenzo and Fernando Parro, "Estimates of the Trade and Welfare Effects of NAFTA," *The Review of Economic Studies*, 11 2014, *82* (1), 1–44.

Chaney, Thomas, "Distorted gravity: the intensive and extensive margins of international trade," *American Economic Review*, 2008, *98* (4), 1707–1721.

Cirera, Xavier and Rajith W D Lakshman, "The impact of export processing zones on employment, wages and labour conditions in developing countries: Systematic review," *3ie Systematic Review*, 2014, *10.*

Conte, Maddalena, Pierre Cotterlaz, Thierry Mayer et al., "The CEPII gravity database," 2022.

Copelovitch, Mark S and David Ohls, "International institutions: Weak commitments and costly signals," *International Theory*, 2012, *9* (3), 330–355.

Coppedge, Michael, John Gerring, Adam Glynn, Carl Henrik Knutsen, Staffan I Lindberg, Daniel Pemstein, Brigitte Seim, Svend-Erik Skaaning, Jan Teorell, David Altman et al., *Varieties of democracy: Measuring two centuries of political change*, Cambridge University Press Cambridge, 2020.

Correia, Sergio, Paulo Guimarães, and Tom Zylkin, "Fast Poisson estimation with high-dimensional fixed effects," *The Stata Journal: Promoting communications on statistics and Stata*, mar 2020, *20* (1), 95–115.

Coscia, Michele, Frank MH Neffke, and Ricardo Hausmann, "Knowledge diffusion in the network of international business travel," *Nature Human Behaviour*, 2020, *4* (10), 1011–1020.

Costinot, Arnaud, Dave Donaldson, and Ivana Komunjer, "What Goods Do Countries Trade? A Quantitative Exploration of Ricardo's Ideas," *The Review of Economic Studies*, 09 2011, *79* (2), 581–608.

Cristea, Anca D, "Buyer-seller relationships in international trade: Evidence from US States' exports and business-class travel," *Journal of International Economics*, 2011, *84* (2), 207–220.

_ , "The role of aviation networks for urban development," *Journal of Regional Science*, 2023, *63* (4), 947–980.

DeLong, J Bradford, "India since independence: An analytic growth narrative," *In Search of Prosperity: Analytic Narratives on Economic Growth*, 2003, pp. 184–204.

Donaldson, Dave, "Railroads of the Raj: Estimating the impact of transportation infrastructure," *American Economic Review*, 2018, *108* (4-5), 899–934.

_ **and Richard Hornbeck**, "Railroads and American economic growth: A market access approach," *The Quarterly Journal of Economics*, 2016, *131* (2), 799–858.

Gaulier, Guillaume and Soledad Zignago, "BACI: International Trade Database at the Product-Level. The 1994-2007 Version," Working Papers 2010-23, CEPII October 2010.

Gorrín, Jesús, José Morales-Arilla, and Bernardo Ricca, "Export side effects of wars on organized crime: The case of Mexico," *Journal of International Economics*, 2023, *144*, 103775.

Greif, Avner, "Institutions and the path to the modern economy: Lessons from medieval trade," 2006.

_ , **Paul Milgrom, and Barry R Weingast**, "Coordination, commitment, and enforcement: The case of the merchant guild," *Journal of Political Economy*, 1994, *102* (4), 745–776.

Haftel, Yoram Z, "The effect of BITs on FDI inflows to developing countries: Signaling or credible commitment?," 2007. Paper presented at the Ohio State University Workshop on Globalization, Institutions, and Economic Security.

Hart, Oliver and John Moore, "Foundations of incomplete contracts," *The Review of Economic Studies*, 1999, *66* (1), 115–138.

Ho, Chun-Yu, Tingting Peng, Haruka Takayama, and Li Xu, "Air Connectivity and International Travel: Evidence from Cross-border Card Payments," 2024.

Holmström, Bengt, "Moral hazard and observability," *The Bell Journal of Economics*, 1979, pp. 74–91.

_ , "Moral hazard in teams," *The Bell Journal of Economics*, 1982, pp. 324–340.

_ **and Paul Milgrom**, "Multitask principal-agent analyses: Incentive contracts, asset ownership, and job design," *Journal of Law, Economics, & Organization*, 1991, *7*, 24–52.

Kaufmann, Daniel and Aart Kraay, "Worldwide Governance Indicators, 2023 Update," http://www.govindicators.org/ 2022. Downloaded on 11-26-2022.

Klein, Benjamin, Robert G Crawford, and Armen A Alchian, "Vertical integration, appropriable rents, and the competitive contracting process," *The Journal of Law and Economics*, 1978, *21* (2), 297–326.

Levchenko, Andrei A., "Institutional Quality and International Trade," *The Review of Economic Studies*, 2007, *74* (3), 791–819.

Macaulay, Stewart, "Non-Contractual Relations in Business. A Preliminary Study," *American Sociological Review*, 1963, *28*, 55–67.

Macchiavello, Rocco, "Relational contracts and development," *Annual Review of Economics*, 2022, *14*, 337–362.

Madani, Dorsati, "A review of the role and impact of export processing zones," *World Bank Policy Research Working Paper*, 1999, (2238).

Maxfield, Sylvia and Ben Ross Schneider, "State-business relations in developing countries: Why and how they matter," *World Development Report Background Papers*, 1997.

McMillan, John and Christopher Woodruff, "Interfirm relationships and informal credit in Vietnam," *The Quarterly Journal of Economics*, 1999, *114* (4), 1285–1320.

Morales-Arilla, Jose and Sebastián Bustos, "Direct flights, trade and specialization," *Trade and Specialization (April 11, 2024)*, 2024.

Nunn, Nathan, "Relationship-Specificity, Incomplete Contracts, and the Pattern of Trade*," *The Quarterly Journal of Economics*, 2007, *122* (2), 569–600.

_ **and Daniel Trefler**, "Chapter 5 - Domestic Institutions as a Source of Comparative Advantage," in Gita Gopinath, Elhanan Helpman, and Kenneth Rogoff, eds., *Handbook of International Economics*, Vol. 4 of *Handbook of International Economics*, Elsevier, 2014, pp. 263–315.

OAG, "Flight Database & Statistics | Aviation Analytics," https://oag.com 2025. Accessed: July 7, 2025.

Pellegrino, Bruno, Enrico Spolaore, and Romain Wacziarg, "Barriers to global capital allocation," *The Quarterly Journal of Economics*, 2025, p. qjaf031.

Rajan, Raghuram and Luigi Zingales, "Financial Dependence and Growth," *The American Economic Review*, 1998, *88* (3), 559–586.

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

Rodrik, Dani, "Policy uncertainty and private investment in developing countries," *Journal of Development Economics*, 1991, *36* (2), 229–243.

_ **and Arvind Subramanian**, "From Hindu growth to productivity surge: The myth of the Indian growth transition," *NBER Working Paper*, 2004, (10376).

Roy, Devesh, Abdul Munasib, and Xing Chen, "Social trust and international trade: the interplay between social trust and formal finance," *Review of World Economics*, 2014, *150*, 693–714.

Schmitz, Hubert and Khalid Nadvi, "Collective efficiency and increasing returns," *Cambridge Journal of Economics*, 1999, *23* (4), 465–483.

Sen, Kunal, "State-business relations and economic development in Africa and India: the analytical issues," 2013, pp. 1–14.

Söderlund, Bengt, "The importance of business travel for trade: Evidence from the liberalization of the Soviet airspace," Technical Report, IFN Working Paper No. 1355 2020.

_ , "Trade on the move: How business travel powers global trade," *VoxEU Column*, 2023.

Spolaore, Enrico and Romain Wacziarg, "Ancestry and development: New evidence," *Journal of Applied Econometrics*, 2018, *33* (5), 748–762.

UNCTAD, "Enhancing the contribution of export processing zones to the Sustainable Development Goals," Technical Report UNCTAD/DIAE/IPB/2015/5, United Nations Conference on Trade and Development 2015.

Wang, Zheng, Feicheng Wang, and Zhuo Zhou, "All Roads Lead to Rome: Global Air Connectivity and Bilateral Trade," *Available at SSRN 3884374*, 2021.

World Bank, *Export processing zones: Policy and research issues*, Washington, DC: World Bank, 1992.

Yap, O Fiona, "Government's credible commitment in economic policy-making: Evidence from Singapore," *Policy Sciences*, 2004, *37* (2), 151–168.

Online Appendix

A.1 Model in detail

We develop a dynamic infinite-horizon model of international sourcing that captures how buyers use business travel to monitor foreign suppliers, and how such relational dynamics substitute for formal contract enforcement institutions.

A.1.1 Environment

Players and Time Structure. A buyer in destination country d sources from a supplier in origin country o. Time is discrete with infinite horizon ($t = 0, 1, 2, \ldots$) and common discount factor $\beta \in (0, 1)$.

Supplier Types. Suppliers are either "Good" (never shirks on contractual obligations, share θ) or "Bad" (shirks if it is economically advantageous to do so, share $1 - \theta$). Type is private information.

Timing Within Each Period. When unmatched, the buyer: (1) decides whether to engage in trade ($E = 1$) or take the outside option ($E = 0$); (2) conditional on trading, decides whether to travel ($\tau = 1$) or not ($\tau = 0$); and (3) matches with a supplier. After matching, the supplier (4) decides whether to honor the contract or shirk, and (5) payoffs are realized. Finally, (6) the relationship continues if the contract is honored; otherwise, it is terminated.

Institutional quality. The parameter $\mu \in [0, 1]$ captures contract enforcement quality in origin country o: $\mu = 1$ implies perfect enforcement; $\mu = 0$ implies no enforcement.

Travel costs. Travel costs $B \geq 0$ are increasing in geographic distance d_{od}: $B = B(d_{od})$, with $B'(d_{od}) > 0$.

Payoffs. If the supplier does not shirk, the buyer and the supplier receive $R - P - B$ and $P - C$, respectively.[12] If the supplier shirks, the buyer's net *loss* and the supplier's net payoff are $P(1 - \mu) + B$ and $P(1 - \mu)$, respectively.

A.1.2 Equilibrium Analysis

We solve the model by backward induction, first analyzing the supplier's shirking decision, then the buyer's travel and contract decisions.

A.1.2.1 The Supplier's Shirking Decision

Consider a bad-type supplier who has been matched with a buyer. The supplier chooses between honoring the contract (not shirking) and shirking.

Lemma 1 (Payoffs from Shirking vs. Honoring)**.** *For a bad-type supplier matched with a buyer:*

- *The present value of* ***not shirking*** *(honoring the contract and maintaining the relationship indefinitely) is:*

$$V^{NS} = \frac{P - C}{1 - \beta} \tag{4}$$

- *The present value of* ***shirking*** *(receiving the one-time gain, terminating the relationship, and then repeating the game with new buyer) is:*

$$V^{S} = \frac{P(1 - \mu)}{1 - \beta} \tag{5}$$

Proposition 1 (Institutional Quality Threshold)**.** *There exists a threshold level of institutional quality μ^* such that:*

- *If $\mu \geq \mu^*$, bad-type suppliers choose not to shirk (pooling equilibrium).*
- *If $\mu < \mu^*$, bad-type suppliers choose to shirk (separating equilibrium).*

The threshold is given by:

$$\mu^* = \frac{C}{P} \tag{6}$$

A.1.2.2 The Buyer's Travel Decision

When institutions are very strong ($\mu \to 1$) and supplier's profit margins are large ($P >> C$), the pool of applicants includes both good and bad suppliers, but all of them, even the bad-types, honor the contract (pooling equilibrium). Therefore, traveling is no longer needed. Let $\mathbb{E}[\pi^{NT} | \mu \geq \mu^*]$ denote the expected present value for an unmatched buyer in this scenario.

Lemma 2 (Buyer's Expected Payoff under Pooling Equilibrium)**.** *If $\mu \geq \mu^*$ the expected present value satisfies:*

$$\mathbb{E}[\pi^{NT} | \mu \geq \mu^*] = (R - P) + \beta \cdot \mathbb{E}[\pi^{NT} | \mu \geq \mu^*] \tag{7}$$

The closed-form solution is:

$$\mathbb{E}[\pi^{NT}|\mu \geq \mu^*] = \frac{R-P}{1-\beta} \tag{8}$$

With weaker institutions or thinner supplier's profit margins ($P \to C$), the pool of applicants still includes both types of suppliers, but the bad-types will choose to shirk (separating equilibrium). Hence, traveling becomes a useful device to discourage opportunistic suppliers. Let $\mathbb{E}[\pi_B^T|\mu < \mu^*]$ and $\mathbb{E}[\pi_B^{NT}|\mu < \mu^*]$ denote the expected present value of an unmatched buyer who decides to travel (monitor) or not, respectively.

Lemma 3 (Buyer's Expected Payoff under Separating Equilibrium without Travel)**.** *If $\mu < \mu^*$ and the buyer does not travel ($\tau = 0$), the expected present value satisfies:*

$$\mathbb{E}[\pi_B^{NT}|\mu < \mu^*] = \theta\left[\frac{R-P}{1-\beta}\right] + (1-\theta)\Big[-P(1-\mu) + \beta \cdot \mathbb{E}[\pi_B^{NT}|\mu < \mu^*]\Big] \tag{9}$$

The closed-form solution is:

$$\mathbb{E}[\pi_B^{NT}|\mu < \mu^*] = \frac{\theta\left(\frac{R-P}{1-\beta}\right) - (1-\theta)(1-\mu)P}{1-\beta(1-\theta)} \tag{10}$$

Lemma 4 (Buyer's Expected Payoff under Separating Equilibrium with Travel)**.** *If $\mu < \mu^*$ and the buyer travels ($\tau = 1$), incurring cost B, bad-type suppliers are discouraged from shirking. Hence, the expected present value satisfies:*

$$\mathbb{E}[\pi^{NT}|\mu < \mu^*] = (R - P - B) + \beta \cdot \mathbb{E}[\pi^{NT}|\mu < \mu^*] \tag{11}$$

The closed-form solution is:

$$\mathbb{E}[\pi_B^{T}|\mu < \mu^*] = \frac{R-P-B}{1-\beta} \tag{12}$$

Lemmas 3 and 4 imply that there is a threshold that separates the area where it is optimal for the buyer to travel and monitor from the area where it is better to save on traveling and take the risk of a bad-type supplier. The next proposition finds that threshold, B^*.

Proposition 2 (Buyer's Optimal Travel Decision)**.** *When $\mu < \mu^*$, the buyer chooses to travel ($\tau = 1$) if and only if:*

$$B < B^* \equiv \frac{(1-\theta)(1-\beta)(R-\mu P)}{1-\beta(1-\theta)} \tag{13}$$

Remark 1 (Properties of the Travel Threshold)**.** *The threshold B^* satisfies:*

(i) $B^*(\mu) \geq 0, \quad \forall \mu \in [0,1]$ *as long as* $R \geq P$.

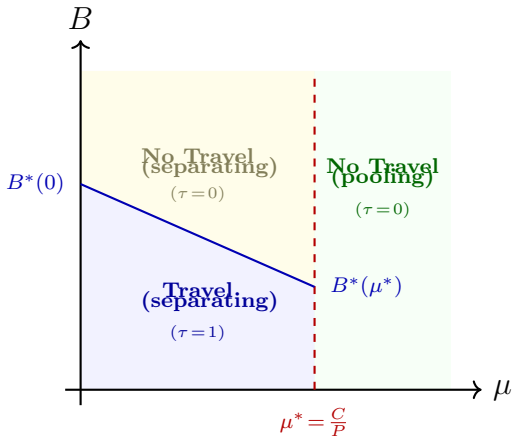
(ii) $B^*(1) \leq B^*(\mu^*) \leq B^*(0)$ *as long as* $R \geq P \geq C$.

(iii) $\partial B^*/\partial \mu < 0$*: Better institutions reduce the value of travel.*

(iv) $\partial B^*/\partial(1-\theta) > 0$*: Widespread opportunistic behavior increases the value of travel.*

Figure A.1 presents the optimal travel decisions in the (μ, B) space. The downward-sloping line is the travel indifference curve $B^*(\mu)$ and the vertical dashed line at μ^* marks the boundary of the pooling equilibrium.

Figure A.1: Equilibrium travel decisions in (μ, B) space



A.1.2.3 The Buyer's Trade Decision

Proposition 3 shows that, under strong institutions, trade takes place only if the buyer's profit *net of opportunity cost* is positive ($\tilde{B} \equiv R - P - L \geq 0$).

Proposition 3 (Optimal Trade Decision Under Pooling Equilibrium)**.** *Suppose $\mu \geq \mu^*$, so the buyer would not travel if trade takes place. The buyer engages in trade ($E = 1$) if and only if:*

$$\mathbb{E}[\pi^{NT} | \mu \geq \mu^*] = \frac{R-P}{1-\beta} \geq \frac{L}{1-\beta} \Rightarrow \tilde{B} \equiv R - P - L \geq 0 \tag{14}$$

Proposition 4 shows that, under weak institutions ($\mu < \mu^*$) and low enough travel costs ($B \leq B^*(\mu)$) to make travel optimal, trade takes place only if travel costs are below the buyer's profit net of his opportunity cost ($B \leq \tilde{B}$). Moreover, note that institutional quality does not play any additional role: trading is only determined by travel costs.

Proposition 4 (Optimal Trade Decision With Travel Under Separating Equilibrium)**.** *Suppose $\mu < \mu^*$ and $B \leq B^*(\mu)$, so the buyer would travel if trade takes place. The buyer engages in trade ($E = 1$) if and only if:*

$$\mathbb{E}[\pi_B^T | \mu < \mu^*] = \frac{R - P - B}{1 - \beta} \geq \frac{L}{1 - \beta} \tag{15}$$

This condition is satisfied if and only if the distance is sufficiently small:

$$B \leq \tilde{B} \equiv R - P - L \tag{16}$$

Proposition 5 shows that, under weak institutions ($\mu < \mu^*$) and high enough travel costs ($B > B^*(\mu)$) to make travel suboptimal, trade takes place only if institutions are not "too weak" ($\mu \geq \tilde{\mu}$). Moreover, note that travel costs do not play any additional role: trading is only determined by institutional quality.

Proposition 5 (Optimal Trade Decision Without Travel Under Separating Equilibrium)**.** *Suppose $\mu < \mu^*$ and $B \geq B^*(\mu)$, so the buyer would not travel if engaging in commerce. The buyer engages in commerce ($E = 1$) if and only if:*

$$\mathbb{E}[\pi_B^{NT} | \mu < \mu^*] = \frac{\theta\left(\frac{R-P}{1-\beta}\right) - (1-\theta)(1-\mu)P}{1 - \beta(1-\theta)} \geq \frac{L}{1-\beta} \tag{17}$$

This condition is satisfied if and only if the institutional quality is sufficiently high:

$$\mu \geq \tilde{\mu} \equiv \frac{(P+L)[1-\beta(1-\theta)] - \theta R}{(1-\theta)(1-\beta)P} \tag{18}$$

Lemma 5 (Relation between $\tilde{B}$ and $\tilde{\mu}$)**.** *We can show that $\tilde{B}$ is the value of $B^*(\mu)$ evaluated at $\mu = \tilde{\mu}$:*

$$\begin{aligned} B^*(\tilde{\mu}) &= \left[\frac{(1-\theta)(1-\beta)}{1-\beta(1-\theta)}\right] R - \left[\frac{(1-\theta)(1-\beta)P}{1-\beta(1-\theta)}\right] \tilde{\mu} \\ &= \left[\frac{(1-\theta)(1-\beta)}{1-\beta(1-\theta)}\right] R - \frac{(P+L)[1-\beta(1-\theta)] - \theta R}{1-\beta(1-\theta)} \\ &= R - P - L \equiv \tilde{B} \end{aligned}$$

Lemma 5 implies that Proposition 5 can be rewritten in terms of $\tilde{B}$ instead of $\tilde{\mu}$:

Proposition 5' (Optimal Trade Decision Without Travel Under Separating Equilibrium)**.** *Suppose $\mu < \mu^*$ and $B \geq B^*(\mu)$, so the buyer would not travel if engaging in*

commerce. The buyer engages in commerce ($E = 1$) if and only if:

$$B^*(\mu) \leq \tilde{B} \tag{19}$$

A.1.3 Main Results

We now synthesize the preceding analysis to characterize the full set of equilibrium trade and travel outcomes. The key objects are the thresholds derived above:

- **Shirking threshold**: $\mu^* \equiv C/P$. When $\mu \geq \mu^*$, all suppliers honor contracts (pooling equilibrium).
- **Travel indifference curve**: $B^*(\mu) \equiv \frac{(1-\theta)(1-\beta)(R-\mu P)}{1-\beta(1-\theta)}$, defined for $\mu \in [0, \mu^*)$. The buyer (weakly) prefers traveling when $B \leq B^*(\mu)$ and not traveling when $B > B^*(\mu)$.
- **Commerce threshold**: $\tilde{B} \equiv R - P - L$. When traveling under weak institutions, the buyer engages in trade if and only if $B \leq \tilde{B}$. When not traveling under weak institutions, the buyer engages in trade if and only if $B^*(\mu) \leq \tilde{B}$.

The buyer's equilibrium in the (μ, B) space—where μ captures the quality of contract enforcement institutions in the exporting country and B captures bilateral travel costs—depends on the relative positions of these thresholds. We begin by establishing a key preliminary result.

A.1.3.1 Trade under good institutions implies trade via travel should be possible at sufficiently low costs

Proposition 6 (Trade via Travel is Always Feasible at Sufficiently Low Cost)**.** *Suppose trade is viable under good institutions, i.e., $R - P \geq L$ (equivalently, $\tilde{B} \geq 0$). Then for any $\mu \in [0, \mu^*)$, the buyer strictly prefers trade with travel to the outside option whenever B is sufficiently small. Specifically, trade with travel dominates the outside option for all $B \leq \tilde{B}$.*

Proof. Under weak institutions ($\mu < \mu^*$) with travel, the buyer's expected present value is $\mathbb{E}[\pi_B^T | \mu < \mu^*] = \frac{R-P-B}{1-\beta}$. The outside option yields $\frac{L}{1-\beta}$. The buyer prefers trade with travel whenever:

$$\frac{R-P-B}{1-\beta} \geq \frac{L}{1-\beta} \iff B \leq (R-P) - L = \tilde{B}.$$

Since $R - P \geq L$ by assumption, we have $\tilde{B} \geq 0$. In particular, trade with travel is strictly preferred for any $B \in [0, \tilde{B})$, and the buyer is indifferent at $B = \tilde{B}$. This holds

for *all* values of $\mu < \mu^*$: the trade-with-travel threshold $\tilde{B}$ does not depend on μ because travel eliminates all shirking risk. □

Remark 2. *Proposition 6 delivers the first key insight:* sufficiently proximate countries always trade in specialized goods, *regardless of the exporter's institutional quality. Since B is increasing in distance, sufficiently short distances imply $B \leq \tilde{B}$, and the buyer can profitably engage in trade by investing in relational monitoring through travel.*

A.1.3.2 Characterizing equilibrium regimes

The equilibrium depends on the interplay of μ, B, and the relative positions of the thresholds $B^*(\mu)$ and $\tilde{B}$. We consider each regime in turn.

Theorem 1 (Regime I: Trade under Good Institutions)**.** *When $\mu \geq \mu^*$ and $\tilde{B} \geq 0$:*

(i) Bad-type suppliers do not shirk (pooling equilibrium).

(ii) Travel provides no relational benefit; the buyer optimally chooses $\tau = 0$.

(iii) Trade occurs regardless of distance.

Proof. By Proposition 1, $\mu \geq \mu^* = C/P$ implies bad types weakly prefer not shirking. Hence all suppliers honor contracts and the buyer's expected payoff is $\frac{R-P}{1-\beta}$ regardless of travel choice. Since travel incurs cost $B \geq 0$ with no benefit (all types already comply), the buyer optimally sets $\tau = 0$. The condition $\tilde{B} \geq 0$ ensures $\frac{R-P}{1-\beta} \geq \frac{L}{1-\beta}$, so trade dominates the outside option for all B. □

For the remainder of this section, we restrict attention to $\mu < \mu^*$ (weak institutions). The buyer's decision involves two stages: whether to travel (conditional on trading), and whether to trade at all. The equilibrium partitions the (μ, B) space into distinct regions.

Theorem 2 (Regime II: Trade with Travel under Bad Institutions)**.** *When $\mu < \mu^*$, the buyer engages in trade with travel ($E = 1, \tau = 1$) if and only if:*

$$B \leq \min\{B^*(\mu),\ \tilde{B}\}.$$

Proof. The buyer prefers traveling to not traveling when $B \leq B^*(\mu)$ (Proposition 2). Conditional on traveling, the buyer prefers trade to the outside option when $B \leq \tilde{B}$ (Proposition 4). Both conditions must hold simultaneously. Hence the buyer trades with travel if and only if $B \leq \min\{B^*(\mu), \tilde{B}\}$. □

Theorem 3 (Regime III: Trade without Travel under Bad Institutions)**.** *When $\mu < \mu^*$, the buyer engages in trade without travel ($E = 1, \tau = 0$) if and only if:*

$$B^*(\mu) \leq \min\{B, \tilde{B}\}$$

Proof. The buyer prefers not traveling to traveling when $B > B^*(\mu)$. Conditional on not traveling under weak institutions, the buyer prefers trade to the outside option when $B^*(\mu) \leq \tilde{B}$ (Proposition 5'). Both conditions must hold simultaneously. □

Theorem 4 (Regime IV: No Trade)**.** *When $\mu < \mu^*$, the buyer takes the outside option ($E = 0$) if and only if:*

$$\tilde{B} \leq \min\{B, B^*(\mu)\}$$

Proof. The buyer does not trade when neither trade-with-travel nor trade-without-travel dominates the outside option. Trade with travel requires $B \leq \min\{B^*(\mu), \tilde{B}\}$, so its logical complement is $B > \min\{B^*(\mu), \tilde{B}\}$. Trade without travel requires $B^*(\mu) \leq \min\{B, \tilde{B}\}$, so its logical complement is $B^*(\mu) > \min\{B, \tilde{B}\}$. "No trade" then requires both conditions to be satisfied simultaneously, which happens only when $\tilde{B}$ is the smallest of the three values. □

A.1.3.3 Three cases for the equilibrium configuration

The equilibrium in the (μ, B) space takes one of three qualitative forms, depending on the relative positions of $\tilde{B}$ and $B^*(\mu)$. We denote $B_0^* \equiv B^*(0)$ and $B_{\mu^*}^* \equiv B^*(\mu^*)$ for brevity.

Theorem 5 (Case 1: $\tilde{B} < B_{\mu^*}^*$ — Trade without travel is never viable)**.** *When $\tilde{B} < B^*(\mu^*)$, the horizontal line $B = \tilde{B}$ lies entirely below the travel indifference line $B^*(\mu)$ for all $\mu \in [0, \mu^*)$. In this case:*

(i) For $B \leq \tilde{B}$: the buyer trades with travel for all $\mu < \mu^*$.

(ii) For $B > \tilde{B}$: the buyer does not trade for any $\mu < \mu^*$.

Trade without travel is never an equilibrium outcome under weak institutions, because at any travel cost high enough to make the buyer prefer not traveling ($B > B^*(\mu)$), the buyer already prefers the outside option ($B > \tilde{B}$).

Proof. From remark 1, we know that $B^*(\mu)$ is decreasing in μ and that it takes its lowest value (in the relevant segment of "weak institutions") when $\mu = \mu^*$, that is: $B_{\mu^*}^* \leq B^*(\mu)$

for all $\mu \in [0, \mu^*]$. Hence the premise $\tilde{B} < B^*_{\mu^*}$ implies $\tilde{B} < B^*(\mu)$ everywhere in the weak-institutions region.

For the buyer to trade *with* travel, we need $B \leq \tilde{B}$ (Proposition 4). For the buyer to trade *without* travel, we need $B^*(\mu) \leq \tilde{B}$ (Proposition 5'), which can never be satisfied for any $\mu < \mu^*$. Therefore, trade without travel is infeasible under weak institutions.

The only viable trade option is trade with travel when $B \leq \tilde{B}$. When $B > \tilde{B}$, the buyer neither finds travel-based trade profitable nor can sustain trade without travel, so no trade occurs. □

Corollary 1. *Under Case 1, specialized trade between countries with poor institutions occurs* only *between sufficiently proximate partners. There is no intermediate regime in which buyers accept the risk of shirking—the choice is simply "travel and trade" or "don't trade at all."*

Theorem 6 (Case 2: $B^*_{\mu^*} \leq \tilde{B} < B^*_0$ — All three regimes coexist)**.** *When $B^*_{\mu^*} \leq \tilde{B} < B^*_0$, the horizontal line $B = \tilde{B}$ intersects the travel indifference line $B^*(\cdot)$ at the unique point $\tilde{\mu}$ $(0 \leq \tilde{\mu} \leq \mu^*)$. The equilibrium partitions the weak-institutions region as follows:*

(i) ***Trade with travel*** *for $B \leq \tilde{B}$ and $B \leq B^*(\mu)$.*

(ii) ***Trade without travel*** *for $B > \tilde{B}$ and $B > B^*(\mu)$.*

(iii) ***No trade*** *elsewhere (for any $\mu < \mu^*$) .*

Proof. Since $B^*(\mu)$ is linear and strictly decreasing in μ with $B^*_{\mu^*} \leq B^*(\mu) \leq B^*(0)$, for all $\mu \in (0, \mu^*)$, the intermediate value theorem guarantees a unique intersection point between the horizontal curve $\tilde{B}$ and the decreasing function $B^*(\cdot)$, which corresponds to the point $(\tilde{\mu}, \tilde{B})$ by Lemma 5. This point marks three possible regions that can be characterized as follows:

- For any μ such that $B < B^*(\mu)$, and for any $B \leq \tilde{B}$ (i.e., any point (μ, B) below both curves) satisfies the conditions of regime 2 (Theorem 2), and thus trade with travel is optimal.
- For any μ such that $B^*(\mu) \leq \tilde{B}$, and for any $B \geq B^*(\mu)$ (i.e., any point (μ, B) above the curve $B^*(\cdot)$ and to the right of the vertical line on $\tilde{\mu}$) satisfies the conditions of regime 3 (Theorem 3), and thus trade without travel is optimal.
- For any μ such that $B^*(\mu) \geq \tilde{B}$, and for any $B \geq \tilde{B}$ (i.e., any point (μ, B) above the curve $\tilde{B}$ and to the left of the vertical line on $\tilde{\mu}$) satisfies the conditions of regime 4

(Theorem 4), and thus no trade is optimal.

□

Theorem 7 (Case 3: $\tilde{B} \geq B_0^*$ — Trade always occurs)**.** *When $\tilde{B} \geq B_0^*$, the horizontal line $B = \tilde{B}$ lies above the entire travel indifference line $B^*(\mu)$ for all $\mu \in [0, \mu^*)$. In this case, trade is always viable under weak institutions—the only question is whether the buyer travels or not:*

(i) ***Trade with travel*** *for $B \leq B^*(\mu)$.*

(ii) ***Trade without travel*** *for $B > B^*(\mu)$.*

No trade never occurs for $\mu < \mu^*$.

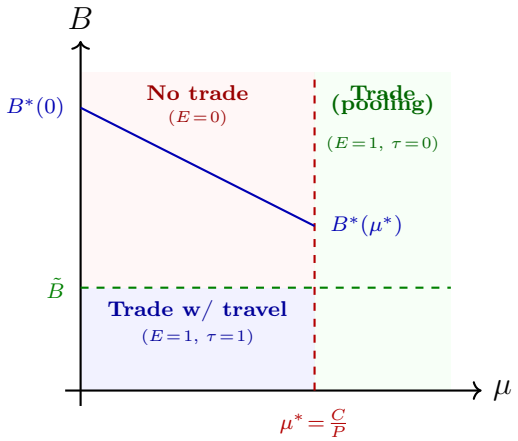
Proof. When $B \leq B^*(\mu)$, the buyer prefers traveling, and since $B \leq B^*(\mu) \leq B_0^* \leq \tilde{B}$, trade with travel dominates the outside option. When $B > B^*(\mu)$, the buyer prefers not traveling, and since $B^*(\mu) \leq B_0^* \leq \tilde{B}$, trade without travel dominates the outside option. □

Corollary 2. *Under Case 3, the value of the trading relationship is so large relative to the outside option that buyers always find it worthwhile to trade, even when institutions are at their worst and the buyer chooses not to travel. In this case, the trade-off is purely about* how *to trade (with or without travel), not* whether *to trade. The travel indifference line $B^*(\mu)$ still determines the mode of engagement.*

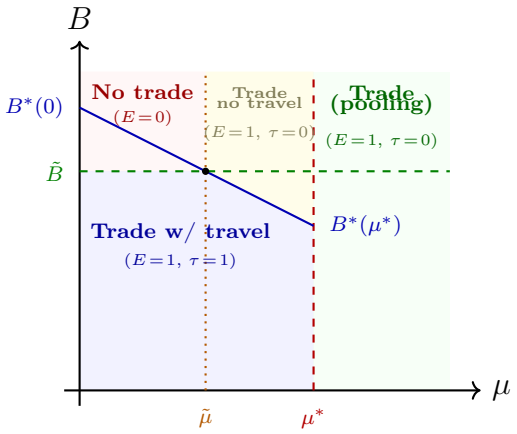
A.1.4 Visual representation of regimes and discussion

Figure A.2 presents the equilibrium regimes in (μ, B) space for each of the three cases. In each panel, the horizontal axis represents institutional quality μ and the vertical axis represents bilateral travel costs B. The downward-sloping line is the travel indifference curve $B^*(\mu)$, the horizontal dashed line is the commerce-with-travel threshold $\tilde{B}$, and the vertical dashed line at μ^* marks the boundary of the pooling equilibrium.

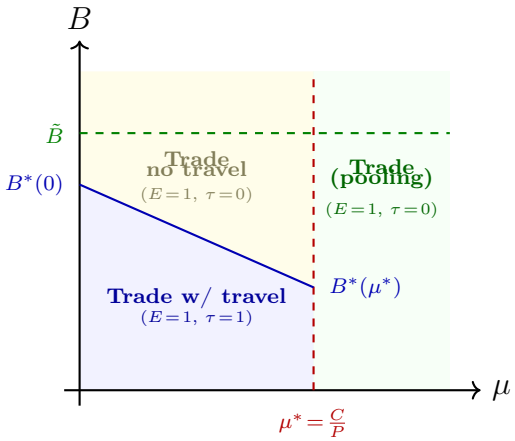
Figure A.2: Equilibrium trade regimes in (μ, B) space



(a) Case 1: $\tilde{B} < B^*(\mu^*)$.



(b) Case 2: $B^*(\mu^*) \leq \tilde{B} < B^*(0)$.



(c) Case 3: $\tilde{B} \geq B^*(0)$.

The three cases characterized above share a common structure that delivers the central prediction of the paper: *geographic proximity substitutes for contract enforcement institutions in enabling specialized trade*. We now provide an intuitive walkthrough of this logic.

Starting point: Trade under good institutions. When institutions are sufficiently strong ($\mu \geq \mu^*$), the threat of legal recourse deters even bad-type suppliers from shirking. The buyer faces no risk of contract violation, so travel provides no screening benefit. Trade occurs at all distances, and institutional quality has no marginal effect because all suppliers already comply. This is Regime I (the right panel of each subfigure in Figure A.2).

Why neighbors always trade. When institutions fall below the pooling threshold ($\mu < \mu^*$), bad-type suppliers shirk. The buyer now faces a genuine risk of being matched

with an opportunistic supplier. Travel becomes valuable because it enables the buyer to screen and monitor suppliers, effectively preventing shirking. Since travel costs increase with distance, this means that sufficiently proximate country pairs—"neighbors"—always engage in specialized trade. This holds even at $\mu = 0$ (the worst possible institutions). The reason is intuitive: at zero travel costs, the buyer can perfectly monitor the supplier at no expense, making the trade-with-travel payoff identical to the good-institutions payoff. This is the key insight: travel completely substitutes for institutions in ensuring contractual compliance. As long as B is low enough relative to the surplus of trade (i.e., $B \leq \tilde{B}$), the buyer can profitably trade with any country regardless of its institutional environment.

The emergence of no-trade zones at long distances. As travel costs increase, trade with travel becomes less attractive. At $B > \tilde{B}$, the per-period cost of monitoring exceeds the surplus from trade, making travel-based commerce unviable. The buyer must then decide whether to trade *without* travel—bearing the risk of shirking and relying solely on institutional recourse. This gamble is only worthwhile when institutions are good enough to make the expected payoff from trade exceed the outside option, i.e., when $\mu \geq \tilde{\mu}$. Countries with institutions below this threshold and travel costs above $\tilde{B}$ are locked out of specialized trade entirely. This generates the no-trade zone visible in Cases 1 and 2 of Figure A.2.

The three cases reflect the value of trade. The case is determined by the trade surplus:

- **Low surplus** ($\tilde{B} < B^*_{\mu^*}$): When the outside option L is relatively attractive or profit margins $R - P$ are thin, the buyer has a low tolerance for the costs of doing business. Trade under weak institutions occurs *only* via travel at short distances. At longer distances, trade is only possible with countries with very strong institutions (the pooling equilibrium). This case produces the starkest version of the substitutability prediction: there is a clean separation between "nearby & bad institutions" and "far & good institutions."

- **Intermediate surplus** ($B^*_{\mu^*} \leq \tilde{B} < B^*_0$): The outside option is moderately attractive or the profit margins are moderate. All regimes coexist: travel-based trade at short distances, no-travel trade at moderate distances with adequate institutions, no-travel trade at any distance with strong institutions, and a no-trade zone for distant partners with weak institutions.

- **High surplus** ($\tilde{B} \geq B^*_0$): The gains from trade are so large that trade is guaranteed to occur. The only choice is between traveling and not traveling.

The key prediction. Across all cases, the model delivers a robust prediction: *the positive effect of institutional quality on specialized trade is increasing in bilateral distance*. At short distances, travel is cheap and institutions do not matter for the trade margin. At longer distances, travel becomes expensive and institutional quality determines whether trade is feasible. Equivalently, *the negative effect of distance on specialized trade is decreasing in institutional quality*. When institutions are strong, distance only affects trade through standard channels (transport costs) and it does not have an additional effect on trade of customized goods; when institutions are weak, distance additionally shuts down the relational contracting channel. These predictions correspond directly to a positive coefficient $\beta_{ED} > 0$ on the triple interaction between relationship-specificity, institutional quality, and log distance in our empirical gravity model.

A.2 Robustness Checks

We conduct several robustness checks to validate our main findings on the substitutability between geographic proximity and contract enforcement institutions in enabling specialized trade.

Temporal stability. Figure A.3 examines whether our core results hold across different years by estimating the key triple interaction term (relationship-specific $\times$ log distance $\times$ institutional quality) separately for 2012, 2015, 2018, 2021, and 2023. This temporal analysis addresses two important concerns. First, it tests whether our findings represent a stable structural relationship rather than year-specific anomalies. Second, and perhaps more importantly, it allows us to assess whether the dramatic shift toward remote work and video conferencing during the COVID-19 pandemic fundamentally altered the role of geographic proximity in facilitating specialized trade. If virtual supervision via platforms like Zoom could effectively substitute for in-person oversight, we would expect the substitutability effect to weaken or disappear in 2021 and 2023.

Panel A of Figure A.3, which uses the continuous Rule of Law index, shows remarkably consistent positive and statistically significant coefficients across all five years. Panel B, using the binary legal origins marker, reveals a similar pattern of stability, though with a slight attenuation in the 2023 estimate. Importantly, the coefficient remains positive and statistically significant even in the post-pandemic period, suggesting that the shift to digital communication tools has not eliminated the fundamental need for face-to-face interaction in monitoring specialized production relationships, particularly in countries with weak formal institutions. To complement this year-by-year analysis, Table A.3 presents pooled regressions that include all five years simultaneously, with time-varying fixed effects. The triple interaction terms remain positive and highly significant (0.697–

0.711 for continuous institutional quality; 0.132–0.183 for legal origins), confirming that our main findings represent robust average effects over the 2012–2023 period.

Alternative institutional measures and confounding factors. Table A.4 addresses concerns about measurement error in our institutional quality variable and potential omitted variable bias from countries' financial development and products financial dependence. Column 1 of Panel A employs an alternative measure of contract enforcement quality: the Rule of Law indicator from the Varieties of Democracy (V-Dem) dataset (Coppedge et al., 2020), which draws on a different set of expert surveys and may capture distinct dimensions of institutional quality compared to the subjective methodological approach of the World Governance Indicators. The triple interaction coefficient remains positive and significant (0.364), providing reassurance that our results are not artifacts of the specific institutional measure chosen.

A more subtle concern relates to the potential confounding role of financial development and products' dependence on external finance, which may correlate with contract enforcement institutions and products' relationship specificity while plausibly having independent effects on trade. Nunn (2007) shows that both contract enforcement institutions and financial development affect countries' comparative advantage in relationship-specific goods. If financial development is correlated with both institutional quality and bilateral trade patterns, our estimates could be biased. Moreover, if products requiring external finance also tend to be relationship-specific, similar confounding of estimates could occur.

Columns 2–3 of of Table A.4 address this by controlling for triple interactions between products' financial dependence, exporters' contract enforcement institutions (or legal origins), and bilateral distance. Columns 4–5 instead control for triple interactions between products' relationship-specificity, exporters' financial development, and bilateral distance. Panel A includes only these additional triple interactions, while Panel B includes the full set of triple interactions with bilateral controls (common language, genetic distance, shared legal origins, and historical ties). Columns 2–3 reveal that controlling for the financial dependence of products attenuates our main estimates by roughly one-half. Still, across all specifications, our core finding that the coefficient on the relationship-specific $\times$ institutional quality $\times$ log distance interaction is positive and statistically significant remains. Estimates considering contract enforcement institutions range from 0.332 to 0.718, while those considering legal origins range from 0.0489–0.164. These results indicate that financial factors, while relevant, do not explain away the fundamental substitutability between proximity and institutions.

Virtual connectivity as an alternative mechanism. A final concern is that our results might be driven not by physical proximity enabling supervision and trust-building, but rather

by the ease of virtual communication between countries in similar time zones. If business relationships can be effectively maintained through video calls and instant messaging, then what appears to be a proximity effect might actually reflect the feasibility of real-time communication rather than the costs of physical travel.

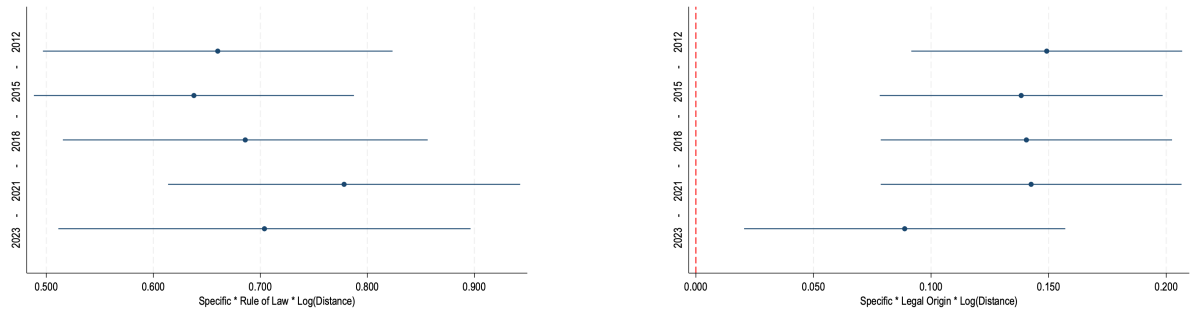
Table A.5 directly tests this alternative explanation by adding controls for time zone differences between country pairs, both as directly tests this alternative explanation by adding controls for time zone differences between country pairs, both as a main effect and as triple interactions with relationship-specificity and institutional quality (Panel A) or legal origins (Panel B). The logic is straightforward: if virtual communication is the key mechanism, then controlling for time zone differences—which affect the feasibility of synchronous online meetings—should attenuate or eliminate our main effects.

The results provide strong evidence against the virtual connectivity interpretation. In Panel A, the triple interaction between relationship-specific, institutional quality, and log distance remains positive and highly significant (0.517–0.683), with magnitudes nearly identical to our baseline estimates in Table 1. The time zone interactions themselves are generally small and statistically insignificant. Panel B shows similar patterns with legal origins. These findings suggest that geographic proximity matters for specialized trade not primarily because it facilitates online communication, but because it enables cost-effective physical presence—consistent with our theoretical framework emphasizing the role of business travel in monitoring production processes and building trust in environments with weak formal contract enforcement.

Taken together, these robustness checks substantially strengthen confidence in our main conclusions. The substitutability between proximity and institutions persists across different years (including the pandemic period), using alternative institutional measures, controlling for financial factors, and accounting for time zone differences. The stability of our findings across these various specifications suggests that we have identified a fundamental structural relationship in international trade: when formal contract enforcement is weak, geographic proximity enables trading partners to sustain specialized commercial relationships.

A.3 Additional Tables and Figures

Figure A.3: Proximity, Contract Enforcement and Specialized trade in 2012, 2015, 2018, 2021 and 2023



(a) Rule of Law Index (b) Legal Origin

Note: Coefficient and confidence interval estimates for the triple interaction between relationship specific, log of distance, and Rule of Law (Panel A) and Legal Origin (Panel B). Specification as described for Column 4 of Table 2. Trade outcome data iterate over years 2012, 2015, 2018, 2021 and 2023.

Table A.1: Distribution of products and trade across classifications.

BEC classification			Products		Trade value		Final
End-use	Processing	Specification	Nbr.	%	bill. US$	%	classification
Final consumption			1,382	26.6	4,703	29.0	Final goods
Intermediate consumption	Primary		339	6.5	1,443	8.9	Generic inputs
	Processed	Generic	1,149	22.1	3,021	18.6	
		Specific	1,648	31.7	4,501	27.7	Specific inputs
Gross Fixed Capital Formation			681	13.1	2,565	15.8	Not included
Total			5,199	100.0	16,233	100.0	

Note: The trade statistics come from the BACI dataset for year 2015.

Table A.2: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	p25	p50	p75	Max
Trade flows (Mil. US$): non-zero flows								
Total	581,355	23.5	378.1	0.0	0.0	0.1	1.2	89,435.6
Specific	167,189	26.9	459.5	0.0	0.0	0.1	1.2	89,435.6
Non-specific	414,166	22.1	339.7	0.0	0.0	0.1	1.2	71,307.9
Trade flows (Mil. US$): incl. zero flows								
Total	3,232,026	4.2	160.6	0.0	0.0	0.0	0.0	89,435.6
Specific	1,077,342	4.2	181.3	0.0	0.0	0.0	0.0	89,435.6
Non-specific	2,154,684	4.3	149.2	0.0	0.0	0.0	0.0	71,307.9
Bilateral variables (Nbr. unique country pairs = 25,651)								
Distance (kms)	25,200	8,562	4,710	21	4,807	8,186	12,110	19,904
Time difference (hrs)	25,200	5.5	4.4	0.0	2.0	5.0	8.0	24.0
Common language (binary)	23,653	0.2	0.4	0.0	0.0	0.0	0.0	1.0
Shared history (binary)	23,650	0.2	0.4	0.0	0.0	0.0	0.0	1.0
Shared legal origins (binary)	20,100	0.3	0.5	0.0	0.0	0.0	1.0	1.0
Genetic distance	18,336	0.1	0.1	0.0	0.0	0.1	0.2	0.3
Country variables (Nbr. countries = 227)								
Legal Origin (binary)	201	0.4	0.5	0.0	0.0	0.0	1.0	1.0
Institutional quality (standardized) [WGI]	202	0.5	0.2	0.0	0.4	0.5	0.7	1.0
French or socialist (obs = 118)	115	0.5	0.2	0.1	0.3	0.4	0.6	1.0
English, German or Scandinavian (obs = 83)	78	0.6	0.2	0.0	0.5	0.6	0.8	1.0
Institutional quality [V-DEM]	175	0.5	0.3	0.0	0.3	0.6	0.9	1.0
French or socialist (obs = 118)	110	0.5	0.3	0.0	0.2	0.4	0.8	1.0
English, German or Scandinavian (obs = 83)	59	0.7	0.3	0.1	0.4	0.7	1.0	1.0
Financial development (% GDP)	173	55.0	43.2	2.3	22.8	45.9	69.8	243.4
Sector-Product type variables (Nbr. = 63; Nbr. with non-zero trade = 52)								
Financial dependence	52	0.3	0.3	-0.1	0.1	0.2	0.4	1.1

Note: Summary statistics for the main variables used in the analysis.

Table A.3: Bilateral trade regressions, years 2012, 2015, 2018, 2021 and 2023

Dependent variable:	Bilateral trade flows by sector and product type			
	(1)	(2)	(3)	(4)
Panel A. Using CE: exporters' contract enforcement quality.				
Log distance	-1.026***			
	(0.024)			
Specific × CE exporter	1.077***	0.852***	-5.020***	
	(0.172)	(0.136)	(0.707)	
Specific × Log distance	0.179***	0.104***	-0.490***	-0.390***
	(0.037)	(0.031)	(0.072)	(0.057)
Specific × CE exporter × Log distance			0.788***	0.717***
			(0.088)	(0.073)
Pseudo R^2	0.893	0.929	0.929	0.950
No. observations	7,472,619	7,472,619	7,472,619	7,472,619
No. clusters	29,704	29,704	29,704	29,704
Panel B. Using LO: exporters' legal origin binary marker.				
Log distance	-1.020***			
	(0.024)			
Specific × LO exporter	0.319***	0.283***	-1.124***	
	(0.048)	(0.040)	(0.279)	
Specific × Log distance	0.165***	0.089***	-0.024	0.081***
	(0.033)	(0.028)	(0.031)	(0.022)
Specific × LO exporter × Log distance			0.188***	0.127***
			(0.036)	(0.030)
Pseudo R^2	0.893	0.929	0.929	0.949
No. observations	7,472,619	7,472,619	7,472,619	7,472,619
No. clusters	29,704	29,704	29,704	29,704
Exporter-sector-year FE	X	X	X	
Exporter-sector-year-product type FE				X
Importer-sector-year-product type FE	X	X	X	X
Country pair FE		X	X	X

Note: Clustered standard errors by country pair in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01. **Specific** is a binary variable equal to one if the traded product is a *relationship-specific* intermediate good, and zero otherwise (i.e., for non-RS intermediate goods and all final goods; capital goods are excluded from the sample). **CE exporter** is a proxy for the quality of *contract enforcement* institutions in the exporting country. **LO exporter** is a binary variable equal to one if the exporter's legal origin is British common law, Scandinavian civil law or German civil law, and zero otherwise (i.e., French civil law or Socialist). All regressions include controls for common language, genetic distance, common colonial history, and common legal origins -all interacted with the RS dummy. Columns 3 and 4 also include triple interactions between the RS dummy, contract enforcement quality (or legal origins dummy), and the respective bilateral controls. All regressions were estimated using the module for Poisson pseudo-maximum-likelihood with multiple levels of fixed effects `ppmlhdfe` of Correia et al. (2020) in Stata BE, version 19.5.

Table A.4: Robustness checks for contract enforcement measure and finance controls

Dependent variable:	(1)	(2)	(3)	(4)	(5)
Panel A: V-DEM CE measure + Simple finance controls					
Specific × Log distance	-0.135**	-0.215***	0.00547	-0.321***	0.123***
	(0.0618)	(0.0592)	(0.0204)	(0.0614)	(0.0377)
Specific × CE exporter (VDEM) × Log distance	0.364***				
	(0.0688)				
Specific × CE exporter (WGI) × Log distance		0.332***		0.718***	
		(0.0748)		(0.0823)	
Specific × LO exporter × Log distance			0.0580**		0.164***
			(0.0284)		(0.0330)
Observations	1,249,406	1,311,782	1,303,126	1,204,733	1,187,136
Alternative CE measure	Yes	No	No	No	No
Fin. dependence control	No	Yes	Yes	No	No
Fin. development control	No	No	No	Yes	Yes
Pseudo R-squared	0.954	0.955	0.955	0.954	0.954
Clusters	24457	25760	25601	23606	23267
Panel B: Complex finance controls					
Specific × Log distance		-0.237***	-0.0146	-0.332***	0.0929**
		(0.0581)	(0.0186)	(0.0605)	(0.0384)
Specific × CE exporter (VDEM) × Log distance					
Specific × CE exporter (WGI) × Log distance		0.335***		0.712***	
		(0.0732)		(0.0852)	
Specific × Legal Origin × Log distance			0.0489*		0.149***
			(0.0266)		(0.0343)
Observations		1,311,782	1,303,126	1,204,733	1,187,136
Alternative CE measure		No	No	No	No
Fin. dependence control		Yes	Yes	No	No
Fin. development control		No	No	Yes	Yes
Pseudo R-squared		0.955	0.955	0.954	0.954
Clusters		25760	25601	23606	23267

Note: Regressions follow specification introduced in Column 4 of Table 2, considering alternative measures of contract enforcement quality and additional controls for the finance dependence of industries and development of countries. Trade outcome data for 2015. Column 1 of Panel A uses countries' Rule of Law Quality measure from the Varieties of Democracy (Coppedge et al., 2020) dataset as an alternative measure of contract enforcement institutions. Columns 2 and 3 of Panel A add controls for the interactions between products finance dependence (Rajan and Zingales, 1998), countries contract enforcement institutions or legal origin and bilateral distance. Columns 4 and 5 of Panel A add controls for the interactions between products relation specificity, countries' financial development (Credit to the private sector as a share of GDP following Nunn (2007)) and bilateral distance. Columns 2-5 of Panel B build on the specifications in the same columns from Panel A, adding interactions of the corresponding financial variables with other bilateral controls: common language, genetic distance, same legal origin and historical ties in the interaction terms for columns 2-5. Column 1 of Panel B is left blank on purpose. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: Bilateral trade regressions including time difference, year 2015

Dependent variable:	Bilateral trade flows by sector and product type			
	(1)	(2)	(3)	(4)
Panel A. Using CE: exporters' contract enforcement quality.				
Log distance	-1.037***			
	(0.031)			
Time difference	0.005			
	(0.008)			
Specific × CE exporter	0.987***	0.724***	-3.087***	
	(0.130)	(0.107)	(0.957)	
Specific × Log distance	0.251***	0.158***	-0.247**	-0.343***
	(0.041)	(0.029)	(0.108)	(0.092)
Specific × Time difference	-0.031**	-0.020**	-0.031	0.006
	(0.012)	(0.009)	(0.023)	(0.018)
Specific × CE exporter × Log distance			0.517***	0.683***
			(0.129)	(0.117)
Specific × CE exporter × Time difference			0.024	-0.020
			(0.031)	(0.026)
No. observations	1,294,184	1,294,184	1,294,184	1,294,184
No. clusters	25,421	25,421	25,421	25,421
Panel B. Using LO: exporters' legal origin binary marker.				
Log distance	-1.028***			
	(0.031)			
Time difference	0.004			
	(0.008)			
Specific × LO exporter	0.329***	0.287***	-0.529*	
	(0.048)	(0.041)	(0.317)	
Specific × Log distance	0.228***	0.136***	0.071**	0.130***
	(0.041)	(0.028)	(0.032)	(0.030)
Specific × Time difference	-0.027**	-0.018*	-0.038***	-0.024***
	(0.012)	(0.009)	(0.010)	(0.007)
Specific × LO exporter × Log distance			0.098**	0.107**
			(0.044)	(0.044)
Specific × LO exporter × Time difference			0.035***	0.013
			(0.013)	(0.012)
Exporter-sector FE	X	X	X	
Exporter-sector-product type FE				X
Importer-sector-product type FE	X	X	X	X
Country pair FE		X	X	X
No. observations	1,303,126	1,303,126	1,303,126	1,303,126
No. clusters	25,601	25,601	25,601	25,601
Pseudo R^2	0.894	0.933	0.934	0.954

Note: Clustered standard errors by country pair in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01. **Specific** is a binary variable equal to one if the traded product is a *relationship-specific* intermediate good, and zero otherwise (i.e., for generic intermediate goods and all final goods; capital goods are excluded from the sample). **CE exporter** is a proxy for the quality of *contract enforcement* institutions in the exporting country. **LO exporter** is a binary variable equal to one if the exporter's legal origin is British common law, Scandinavian civil law or German civil law, and zero otherwise (i.e., French civil law or Socialist). All regressions include controls for common language, genetic distance, common colonial history, and common legal origins -all interacted with the Specific dummy. Columns 3 and 4 also include triple interactions between the Specific dummy, contract enforcement quality (or legal origins dummy), and the respective bilateral controls. All regressions were estimated using the module for Poisson pseudo-maximum-likelihood with multiple levels of fixed effects `ppmlhdfe` of Correia et al. (2020) in Stata BE, version 19.5.