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Does institutional quality matter for trade? Institutional conditions in a sectoral trade framework

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Abstract

This article examines the extent to which national institutional quality affects bilateral sectoral trade flows, as well as whether the conditioning role of institutions for trade has been waxing or waning with time. Based on a new trade theory framework, we derive a sectoral gravity equation, including novel variables corresponding to the exporter's labour competitiveness levels, along with importer's price indices and sectoral incomes, and analyse industry specific bilateral trade flows of 186 countries for the period 1996-2012. We address potential endogeneity and econometric drawbacks by means of Poisson Pseudo-Maximum Likelihood estimation methods. The results indicate that both the institutional conditions at destination and the institutional distance between exporting and importing countries are relevant factors for bilateral trade. Moreover, the effect associated to institutional conditions at destination moderately increases over time. This is a robust outcome across economic sectors, with higher values for agriculture and raw materials than for manufacturing and services.

Keywords: international trade, gravity equation, institutional quality, public policy

JEL codes: F10, Z18, D02, K4, Z14

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1. Introduction

The role of institutions as a driver of economic development has been attracting considerable attention in the literature on long-run economic growth. It has been widely acknowledged that local institutional conditions shape growth trajectories in different parts of the world (Acemoglu et al., 2005; Rodríguez-Pose and Storper, 2006). Trade is also considered a fundamental driver of economic growth. Yet, our knowledge about how the local quality of institutions impinges on trade trends remains limited. It has been claimed that good institutional environments facilitate bilateral trade. High institutional quality reflects pluralistic and inclusive political institutions that facilitate the existence of a level playing field, where individual economic agents cannot abuse market power by monopolizing trade in their favour (e.g., tariffs and quotas), and thereby restrict flows as a result of rent-seeking activities. Indeed, institutional quality and smaller gaps in governance drive trade flows (De Groot et al., 2004), while weak or inadequate institutions may restrain trade in magnitudes which are not dissimilar to those related to the introduction of tariffs (Anderson and Marcouiller, 2002; François and Manchin, 2013). Specific institutional dimensions have also been found to affect trade. Low levels of trust, for example, have been associated with lower bilateral trade in the European context (Guiso et al., 2009), whereas both an efficient rule of law and a good endowment of informal institutions can facilitate trade (Yu et al., 2015).

In a recent contribution Nunn and Trefler (2014) review the theoretical and empirical literature emphasizing the interdependences between trade and institutions, providing ample evidence of the impact of international trade on domestic institutions. Trade affects institutions in a number of ways; particularly, through the complexity of intermediate inputs in relationship-specific investments and the need for contract security (see also Nunn, 2007). Their results offer empirical evidence that institutional quality is the single most important source of long-run gains from trade. Institutional differences constitute also an entry barrier for foreign direct investment (Demir and Hu, 2015) and a good institutional framework is a requirement for the positive effect of the foreign direct investment channel on economic growth (Jude and Levieuge, 2016).

From a theoretical perspective, Levchenko (2007) extends the Ricardian model of comparative advantage, introducing the effect of institutions. It represents an alternative approach to those studies whose underlying models are based on the new trade theory, as the one proposed in this study. His results, relying on the set same set of indicators by the

World Bank to explain US imports in 1998, show a positive effect of institutions on comparative advantage. Blonigen and Piger (2014) review the literature and analyze the effect of institutions on foreign direct investment in OECD countries. They use Bayesian estimation methods and their results are less conclusive with respect to the effect of institutions. Finally, Benáček et al. (2014) find that institutions, social governance and political risk are key factors in determining FDI flows, although results differ depending on the groups of countries considered. As a result, there is an extensive literature analyzing the role of institutions in trade and related flows such as FDI, and from alternative theoretical perspectives.

Despite these contributions, the association between institutions and trade can benefit from further study. It has been argued that "defining institutions is notoriously difficult and the current literature on the topic does not agree on a common definition" (Rodríguez-Pose, 2013: 1037). Hence, it is no surprise that Nunn and Trefler (2014: 265) circumvent the problem by simply avoiding defining institutions. Measuring institutions across different territorial contexts has also proven difficult. In particular, informal institutions – trust, individual habits, values, group routines and social norms – are more difficult to assess and value than formal ones – laws, rules, and organization (Amin, 1999). For this reason, in our analysis, we do not rely on a single definition or dimension of institutions and consider the whole range of World Governance Indicators elaborated by the World Bank (Kaufmann et al., 2010). As with any other institutional measure, these indicators are imperfect, but represent the most comprehensive set of variables capturing the quality of institutions to date and allow testing the overall robustness of the results.

Much of review literature is based on the estimation of gravity equations and relies on World Bank indicators, as in the case of the present study.[1] Nevertheless, we make a theoretical contribution based on a new trade theory framework that allows us to analyze sectoral trade determinants—for the primary, industrial and service sectors, while relying on the most suitable estimation technique associated to the Poisson Pseudo-Maximum Likelihood estimator. Our database also covers a larger sample of countries and a longer period than previous studies. The paper focuses on two key issues: a) whether local institutional quality affects the volume of trade by any given country, both at the aggregate level and by sectors; and b) from a dynamic perspective, whether the impact of institutions

[1] Head and Mayer (2013) offer a chronological overview on the most common and/or efficient methods in the empirical estimation of gravity equations.

has been waxing or waning with time. In trying to answer these two questions, the paper improves our understanding of which institutions matter for sectoral international trade both from a theoretical and applied perspective.

Studying the effects of institutional quality on sectoral trade requires the adoption of a theoretical model that can serve as microeconomic foundation for the econometric specification. This comes prior to the introduction of government quality indicators as a control variable for bilateral trade fostering or hampering trade. For this reason, and based on standard new trade theory models, we identify a sectoral gravity equation that we use to study the effects of institutional factors on bilateral trade. The specification identifies relevant explanatory variables of trade at sectoral level such as labour competitiveness in origin (in terms of productivity and wages), along with price indices and sectoral income shares at destination. Subsequently, institutional conditions in the countries of origin and destination are included in a larger specification of trade costs controlling for distance, contiguity (border effect), existence of regional trade agreements and cultural proximity, measured in the form of colonial links and the use of a common language.

From an applied perspective most of the literature analysing the role of institutions on trade considers trust indicators by the Eurobarometer, institutional indicators from the World Bank, and alternative datasets about institutional quality and governance (De Groot et al., 2004; Linders et al., 2005; and François and Manchin, 2013). We go beyond this literature and account for all dimensions of institutional quality in the World Bank dataset. This means that our dataset is the most comprehensive and representative of sectoral trade flows and institutional conditions to date. Institutions are introduced in two different ways: 1) as a barrier at destination, and 2) as the difference between the institutional indicators of the importing and exporting countries, as a measure of institutional distance. On top of the institutional indicators, the dataset contains information on trade on tangible goods (commodities) as well as services covering 186 countries over the period between 1986 and 2012. Geographical distances, common border, cultural ties (including language) and regional trade agreements are also accounted for, so as to control for additional transport costs and trade barriers. The empirical strategy, moreover, follows Santos Silva and Tenreyro (2006, 2010, 2015) and François and Manchin (2013) in relying on the Poisson-Pseudo Maximum Likelihood method (PPML) as the most suitable econometric method. The Poisson estimator is consistent and unbiased in presence of heteroscedasticity when the data has a large number of zeros.

Summing up, the article proposes a structural specification of the gravity equation for bilateral trade at the sectoral level, allowing to identify relevant determinants of trade. It makes use of suitable econometric techniques based on the PPML estimation method and determines the role of institutional quality in world trade making use of a comprehensive dataset including a large variety of countries at different stages of development and economic specializations across sectors.

With these aims in mind, the paper unfolds as follows. The next section introduces the theoretical model on which the analysis is based. Section 3 dwells on the data used in the empirical analysis and its sources. The effects of institutional barriers on sectoral countries across the world are estimated in section 4, allowing us to address the questions of whether institutions matter for trade and whether, if that is the case, their influence has been waxing or waning over time. The analysis also unveils disparities across sectors in the relationship between institutional quality and trade patterns. Finally, Section 5 draws conclusions.

2. Model

We estimate the effect of institutional barriers on trade flows between any two economies *i* and *j* relying on a theoretically founded specification of the gravity equation based on the so-called new trade theory, NTT. The model is characterized by the Dixit-Stiglitz-Krugman assumptions regarding "love-for-variety" preferences, increasing returns to scale technologies and iceberg transport costs. Following Barbero et al. (2015), it allows for multiple countries and multiple differentiated sectors in trade flows definition (exports and imports), thereby extending the different specifications surveyed by Behrens and Ottaviano (2009). These authors summarize the NTT analytical framework including the effect of transport and non-transport related trade costs for the case of two countries. We extend this model and include our independent variable of interest, institutional quality, as yet another barrier to sectoral trade, and empirically test if it affects alternative sectors in different ways.

2.1 Sectoral trade framework

We derive the sectoral gravity equation allowing for a continuum of varieties within multiple sectors and countries. The industrial production of these varieties in each country is characterized by increasing returns to scale at the firm level, while the structure of the industry is that of monopolistic competition, permitting free entry and exit of firms. This

prevents the existence of strategic interactions, as well as individual market power, and results in an optimal number of viable firms earning normal (zero) profits in equilibrium.

2.1.1 Consumer preferences and demands

The preferences of an individual consuming all varieties in economy *j* are given by:

$$U_j = \prod_s D_{sj}^{\mu_{sj}}, \quad (1)$$

where D_{sj} is the aggregate consumption of the differentiated good in sector *s* in country *j*; and $0 < \mu_{sj} < 1$ is the income share spent on each sector *s* by consumers in *j*. The aggregate consumption of each differentiated good, D_{sj}, corresponds to the following constant elasticity of substitution (CES) subutility function:

$$D_{sj} = \left[\sum_i \int_{\Omega_{si}} d_{sij}(\omega)^{(\sigma-1)/\sigma}\, d\omega\right]^{\frac{\sigma}{\sigma-1}}, \quad (2)$$

where $d_{sij}(\omega)$ is the individual consumption of sector *s* variety ω produced in *i* and consumed in *j*; and Ω_{si} is the set of varieties of sector *s* produced in *i*. The parameter $\sigma > 1$ measures the elasticity of substitution between any two varieties, as well as the price elasticity of demand. Let $p_{sij}(\omega)$ denote the price of sector *s* variety ω produced in *i* and consumed in *j*; and w_j be the wage rate in region *j*.

Maximizing the utility (1) subject to the budget constraint—with the wage rate representing individuals' income resulting from labour market clearing:

$$\sum_s \sum_i \int_{\Omega_{si}} p_{sij}(\omega) d_{sij}(\omega) d\omega = w_j, \quad (3)$$

yields the following country *j*'s demand for each variety ω produced in *i*:

$$d_{sij}(\omega) = \frac{p_{sij}(\omega)^{-\sigma}}{P_{sj}^{1-\sigma}} \mu_{sj} w_j L_j, \quad (4)$$

Where L_j is the number of workers/consumers in region *j*, and P_{sj} is the CES price index in sector *s* and region *j*, defined as:

$$P_{sj} = \left[\sum_i \int_{\Omega_{si}} p_{sij}(\omega)^{1-\sigma} d\omega\right]^{\frac{1}{1-\sigma}}. \quad (5)$$

2.1.2 Firms: technology and trade

Firms operate under increasing returns to scale and technology is assumed to be identical across firms within a country. This implies that each firm produces a single variety and that they differ only by the variety of goods and services produced and the country where they are located in. Since all varieties enter consumer preferences in a symmetric way, we supress the variety index ω to alleviate notation. Production of any variety involves a fixed labour requirement, F_i, and a constant marginal labour requirement, c_i. Trade in the differentiated products between countries is hampered by transport and non-transport related barriers (trade costs). Trade costs enter the model in the standard "iceberg" form, which implies that the cost of each variety from sector *s* and country *i* is multiplied by $\tau_{sij} \geq 1$, resulting in the delivered price at country *j*. The labour requirement of a firm for producing the output in sector *s* and located in country *i* is thus given by $l_{si} = F_i + c_i \sum_i \tau_{sij} d_{sij}$.

2.1.3 Market equilibrium

A country *i* firm producing in sector *s* maximizes profits:

$$\pi_{si} = \sum_j p_{sij} d_{sij} - \left(F_i + c_i \sum_j \tau_{sij} d_{sij}\right) w_i. \quad (6)$$

Assuming that markets are characterized by monopolistic competition, with free entry and exit, and the absence of strategic interactions, thereby forcing null profits, first-order conditions under price competition yield the following equilibrium price as a constant mark-up:

$$p_{sij} = \left(\frac{\sigma}{\sigma-1}\right) c_i w_i \tau_{sij}, \quad (7)$$

Therefore, bilateral trade flows are obtained aggregating the value of exports of sector *s* from country *i* to country *j* for all firms in the sector, n_{si}, as follows:

$$x_{sij} = n_{si} p_{sij} d_{sij} = n_{si} \left[\left(\frac{\sigma}{\sigma-1}\right) c_i w_i\right]^{1-\sigma} \left(\tau_{sij}\right)^{1-\sigma} \left[\left({P_{sj}}^{\sigma-1}\right) \mu_{sj} w_j L_j\right], \quad (8)$$

which represents the specific gravity equation for bilateral trade in the proposed analytical framework. The value of sector *s* export flows from *i* to *j* depends inversely on a measure of labour competitiveness jointly represented by the marginal factor requirements and wages of the exporter region: $c_i w_i$, rendering country *i* more competitive as the required labour inputs and salaries decrease, thereby reducing mill prices (and vice versa), as well as

transport costs τ_{sij}. Conversely, they are directly related to the number of firms in the sector in the exporting country, n_{si}, the price index P_{sj} of the importing country, and its share of income spent in sector *s*, $\mu_{sj} w_j L_j$.

2.2 Econometric specification and PPML estimation

From the gravity equation in (8) and taking logs, we obtain the following specification:

$$\ln x_{sij} = \ln n_{si} + (1-\sigma)\ln\left(\frac{\sigma}{\sigma-1}\right) + (1-\sigma)\ln(c_i w_i) + (1-\sigma)\ln\tau_{sij} + (\sigma-1)\ln P_{sj} + \ln(\mu_{sj} w_j L_j) \quad (9)$$

Consequently, considering time period *t*, and the Poisson Pseudo-Maximum Likelihood (PPML) estimation method discussed, the functional form to be estimated corresponds to the following econometric specification:

$$x_{sijt} = \beta_0 + \beta_1 \ln(c_{it} w_{it}) + \beta_2 \ln\tau_{sijt} + \beta_3 \ln P_{sjt} + \beta_4 \ln(\mu_{sjt} w_{jt} L_{jt}) + \delta_{si} + \lambda_{st} + v_{sijt} \quad (10)$$

where $\beta_0 = (1-\sigma)\ln\left(\frac{\sigma}{\sigma-1}\right)$, δ_{si} represents the individual effects in origin to capture country specific characteristics and the unobservable number of firms, λ_{st} are time effects, and v_{sijt} is the error term.

Trade barriers τ_{sijt} are further specified to consider the institutional factors of interest conditioning trade and additional variables related to both transport related costs, proxied by physical distance (*dist)* and geographical contiguity (*cont*), to control for border effects, cultural distance (*lang*, common language), colonial links (*colink*), and commercial association derived from belonging to the same regional trade agreement (e.g., UE, NAFTA, Mercosur, etc.).[2]

[2] We have considered the possibility of introducing tariffs in our regressions, but run into severe problems: i) the introduction of tariffs drastically reduces the sample as data are unavailable for many countries, and, when present, they are not normally recorded at the sectoral level; i.e., there is no variability across sectors which is the aim of our study; ii) the reduction in the sample is aggravated by the fact that there are already many observations for which trade is zero; i.e., in those cases in which there is no trade, the value of tariffs is missing, although they might exist and be positive, hampering trade to the point that no data are reported. This poses the additional difficulty of discriminating between zero and missing data. Dropping observations with zero or missing data reduces the sample even further; iii) tariffs correlate highly with regional trade agreements and contiguity. However, although we contend that considering tariffs jeopardizes the reliability of results given the above drawbacks and precludes the analysis at the sectoral level, we have run equivalent regression for trade in tangibles including tariffs. The results, available upon request, show that tariffs exhibit the expected negative sign and statistical significance, with a value similar to those of regional trade

$$\ln\tau_{sijt} = \gamma_k I_{ijk,t-1} + \alpha \ln d_{ij} + \varphi cont_{ij} + \rho lang_{ij} + \eta colink_{ij} + rta_{ijt}, k= 1...6 \quad (11)$$

We propose two alternative specifications for the *k* institutional barriers, whose only difference lies in the definition of the governance indicators of *Control of corruption*, *Government effectiveness*, *Political stability and absence of violence*, *Rule of law*, *Regulatory quality*, and *Voice and accountability*—discussed in the next section. A first definition considers them in *levels* (*l*) at the country of destination *j*, $I^{l}_{jk,t-1}$, to determine to what extent weak institutional quality is capable of holding back import flows. The second one focuses on the *difference* (*d*) in the quality levels of the importing (destination) and the exporting (origin) countries: $I^{d}_{ijk,t-1}=I^{l}_{jk,t-1} - I^{l}_{ik,t-1}$. This represents a measure of institutional distance between *j* and *i* that does not assume a symmetry of impediments between importing and exporting countries—as taking their absolute values would. It captures in a simple way how better (if positive) or worse (if negative) is the quality of the institutions in the importing country with respect to that of the exporter.

Following Nunn (2007), we acknowledge that adopting this specification strategy must be considered with caution because, while weak institutional quality or high institutional distances are capable of holding back import flows, causality may run both ways with trade flows influencing governance. This eventually results in the endogeneity of institutional measures, which can be dealt with by resorting to the common procedure of lagging their values, thereby correcting the possible correlation between these regressors and the error term. This is in accordance with the fact that governance quality most likely has a lagged effect on trade, although the specific timing of that lag to one year, or earlier periods, is not that relevant given the slow changing nature of these indictors—and it should be ultimately checked in terms of their statistical significance. Finally, as for the contiguity, common language, and colonial links, these dummies take value one when countries *i* and *j* share common border, language, colonial ties, and regional trade agreements, respectively.

The estimation is performed using the Poisson Pseudo-Maximum Likelihood (PPML) estimator proposed by Santos Silva and Tenreyro (2006, 2010, 2015), accounting for the fact that the sample includes a large number of zeros, and obtaining estimators that are more efficient than their OLS counterparts. This method identifies and eventually drops regressors that may cause the non-existence of the (pseudo) maximum likelihood estimates.

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agreements, which nevertheless lose their statistical significance; i.e., tariffs and regional trade agreements are substitute to each other with opposite signs.

Therefore, in the case of trade data it presents several advantages given the problems posed by the existence of numerous zeros, and the presence of dummies (see also Head and Mayer, 2013). In addition, the PPML can solve the bias caused by heteroscedasticity, serial correlated error and multicollinearity, because of a high correlation among determinants in the structural gravity equation and the country-time dummies.

3. Data and sources

The empirical analysis is performed on a comprehensive dataset, constructed from several sources. Data on bilateral trade of tangible goods is gathered from the UN Comtrade database, whereas that corresponding to services stems from the UN Service Trade. The data are available for the periods 1996-2012 and 2000-2012, respectively. This dataset was developed by the United Nations Statistics Division (UNSD) and provides bilateral statistics among 186 countries for tangibles and 181 in the case of services. Trade data on tangibles are further disaggregated into the primary (agriculture and raw materials) and industry sectors to test for trade differences between them.

Country-specific variables correspond to labour competitiveness, sectoral price indices, and sectoral Gross Value Added (GVA) in the importing – destination – country *j*. Current and constant GVA by type of economic activity are extracted from UN data. Data on labour competiveness depending on productivity and wages is proxied by the GVA per worker of the exporting country. This implies that in accordance with the model, the higher the labour productivity, the lower the marginal requirements, and while salaries could be positively correlated with productivity, we would anticipate that the former effects predominates; i.e., a positive coefficient is expected in the regression results. Employment is taken from the World Databank elaborated by The World Bank. The sectoral price indices are proxied by sectoral GVA deflators using current and constant 2005 values.

Geographical distances, adjacency, common language and colonial bonds are idiosyncratic characteristics that are taken into account for each pair of countries, as they may represent relevant enablers/barriers to bilateral trade. Distances between countries, as well as information about contiguity, common official language and past colonial ties are obtained from the GeoDist database elaborated by Mayer and Zignago (2011). We use geodesic distances, calculated by computing the distance between the most populated cities of each country. Regional trade agreements data come from de Sousa (2012).

We study the role played by institutions in promoting or hindering trade and test whether better institutions promote bilateral trade, often counterbalancing the potentially negative effects associated with existing trade barriers, such as longer distances, lack of contiguity, and cultural differences. The measure of institutional quality at country level stems from the World Bank's *World Governance Indicators* (WGI), elaborated by Kaufmann et al. (2010). While not exempt from controversy, the WGI is the most detailed and geographically comprehensive array of institutional indicators currently available.[3] The WGI provides six governance indicators for 215 economies over the period 1996-2013, capturing different aspects of institutional quality at a national level. Our regression variables correspond to these indicators measured in differences from the mean, so a zero value indicates that a country's institutional quality is on the average. Therefore a positive (negative) value indicates that the observed governance quality is above (below) average. We discuss the main elements in the composition of these six indicators in turn:

- *Control of corruption* (CC) is a measure of anti-corruption policy; i.e., how a society prevents that public power is used by individuals to obtain private gains. It measures, among other things, the level of irregular payments, the degree of corruption in administrations and companies, and the frequency of corruption in public institutions. It is assumed that corruption increases transaction costs and introduces a component of uncertainty in economic transactions which will hamper bilateral trade.
- *Government effectiveness* (GE) measures the quality and satisfaction of the general public with public services, bureaucracy, infrastructure as well as the credibility of governments. This measure is a proxy for the ability of a government to deliver efficient and effective policies.
- *Political stability and absence of violence* (PV) is an indicator of politically motivated violence, terrorism, social unrest, armed conflicts. Lower political stability and greater violence are expected to be detrimental to trade.

[3] The World Bank Global Governance Indicators are composite ratings that combine multiple sources of institutional information in order to increase accuracy. A point estimate and a confidence interval is computed for each of the six institutional quality indicators assessed. These indicators have, however, two main shortcomings: (1) they are only available for a limited period of time, and (2) the individual sources combined in the indicator can be influenced by–or reflect–other sources used to compute the composite index, as a result of being built on the basis of information provided by panels of country-experts who bear in mind their knowledge of the other variables when building the indicators (Williams and Siddique, 2008).

- *Rule of law* (RL) captures confidence in the judicial system, contract enforcement, property rights, law enforcement against violent and organized crime, and judicial independence. It is a proxy for the overall quality of the legal system.
- *Regulatory quality* (RQ) measures the ability of the government to implement policies to promote private sector development. It considers the capacity to tackle unfair competition practices, the ease of starting a new business, the presence of anti-trust policy, financial freedom and tax effectiveness, as well as the presence or absence of imposed price controls, excessive protections,… It complements the indicators depicting control of corruption and rule of law.
- *Voice and accountability* (VA) captures the extent to which citizens are able to participate in choosing their government representatives, as well as the existence of civil liberties, free press, freedom of speech, freedom of association, and human rights.

Combining all 186 countries for the period 1996-2012, the dataset includes a total of 178,129 observations of bilateral trade flows of tangible goods. For bilateral trade in services the sample size is reduced to 30,724 observations for the period 2000-2012. The descriptive statistics for the variables considered in the analysis are presented in Table 1. It is interesting to note that, on average, the value for the institutional distance is negative, showing that institutional levels of the exporter countries are higher than those of the importing countries.

Table 1: Descriptive statistics

Variables	*Mean*	*Std. Dev.*	*Min*	*Max*	*Change Rate 1996-2012* (%)
Trade of tangible goods (in millions USD)	505.508	5,367.143	0.000	353,782.656	141%
Distance (in km)	7,237.366	4,447.882	59.617	19,812.043	3%
Labour competitiveness in origin (exporter) (in thousands USD)	27,442.002	31,908.784	182.435	234,474.469	75%
Sectoral price at destination (importer)	1.115	0.344	0.177	2.885	70%
GVA Tangible (importer) (in thousands of millions USD)	107.734	371.887	0.005	4,555.146	85%
Institutional indicators in the importing country, I^{l}_{jkt}					
Control of corruption	0.038	1.046	-1.924	2.586	-113%
Government effectiveness	0.064	1.015	-2.450	2.430	-54%
Political stability	-0.067	0.976	-3.324	1.938	0%
Rule of law	-0.008	1.015	-2.669	2.000	-14%
Regulatory quality	0.065	1.005	-2.675	2.247	-65%
Voice and accountability	-0.048	1.004	-2.284	1.826	26%
Institutional distance as the difference in indicators between imp. and exp. countries, I^{d}_{ijkt}					
Control of corruption	-0.215	1.518	-4.499	4.096	-25%
Government Effectiveness	-0.281	1.444	-4.697	4.261	-8%
Political Stability	-0.102	1.349	-4.775	4.419	-57%
Rule of Law	-0.229	1.452	-4.621	3.890	-19%
Regulatory Quality	-0.295	1.395	-4.658	4.610	-12%
Voice and Accountability	-0.229	1.376	-3.991	3.664	-25%

4. Estimating the effect of institutional barriers on sectoral trade in world countries

As in the recent literature examining the impact of institutions on trade (Anderson and Marcouiller, 2002; De Groot et al., 2004; Linders et al., 2005; Yu et al., 2015), we base our analysis on the gravity equation. However, our formulation allows the analysis of bilateral sectoral flows relying on a specification derived from the underlying theoretical model and using what we consider to be the most complete database that has been gathered for this purpose. Consequently, the novelty of the paper resides in the inclusion of new variables such as the labour competitiveness measure in origin, along with sectoral prices indices and sectoral expending (market size) at destination, as determinants of sectoral trade. These

variables can be found in the literature analysing the implications of income inequality on trade, for which we provide a rigorous justification and concrete specification (Rodríguez-Pose, 2012).

4.1 Do institutions matter for trade?

In a first stage we estimate the gravity model (10) for total tangible commodities, i.e. without differentiating between primary and non-primary sectors. All model specifications include year and exporter fixed effects to control for their corresponding specific factors, such as supply and market capacity, as well as to control for trade policy features of exporting countries. Head and Mayer (2013) highlight that importer and exporter fixed effects could be used to capture the multilateral resistance terms that emerge from theoretical models, as introduced by Eaton and Kortum (2002), Anderson and Van Wincoop (2003), and Baier and Bergstram (2009). This modelling strategy works best on empirical specifications that do not rely on structural models, as it allows dismissing the identification of relevant variables and their specific individual effects (i.e., magnitude and significance). This is not our case as we base our econometric specification on a model including a multilateral resistance term and sectoral income at destination. Therefore, the structural variables derived from the theoretical model are considered as relevant factors in the estimation. This strategy allows us to identify potentially relevant trade determinants in the gravity equation, making sure that the effect of institutional indicators is unbiased.

The analysis covers both institutional quality levels and differences, as presented in equation (11). It controls for geographical distances, common border, language, colonial links, and regional trade agreements as determinants of trade costs. As previously discussed, the rationale behind these two measures is that better institutional conditions in the importing country would guarantee legal security and reduce uncertainty, which could be further reinforced the higher the institutional distance between importing and exporting country. Given the governance variables considered in the analysis, we hypothesise that better institutional quality at destination and a high relative difference in favour (or against) the importing country facilitates (hampers) trade. Arguably, what matters for exporters is whether the risks at the country of destination related to differences and/or lack of familiarity with formal procedures, business practices, norms of behaviour and contract enforcement—e.g., by sanctioning international agreements– are reduced by worthy governance (De Groot et al., 2004; Yu et al., 2015). Traditionally, the majority of bilateral trade has taken place between countries with high levels of institutional quality and,

therefore, with small differences in their indicators, resulting in a limited effect on trade. This is not the case in the present study. The six institutional indicators are highly correlated. Nevertheless, we use every indicator individually as each of them measures a different facet of the institutional quality of a country. This allows us to test the relative robustness of results depending on the specific definition or dimension of institutional quality considered. Consequently, we run separate regressions involving each institutional variable instead of building a combined indicator capturing overall institutional quality (e.g. by factor analysis), whose interpretation in turn would, inevitably, be controversial.

Table 2 presents the estimation results of the analysis for trade in tangible goods according to the gravity specification (10). Regarding the economic variables derived from the underlying model, results for each separate regression show that the labour competitiveness of the exporting country, in the form of lower factor requirements and wages, affects bilateral trade in positive ways. Recall that labour competiveness is proxied by the GVA per worker of the exporting country. This implies that the higher the labour productivity, the lower the marginal requirements, and while the relationship of salaries with productivity at firm level is disputed, the positive sign for this coefficient suggests that higher productivity results in greater labour competitiveness. The sectoral price index allows to take into account the relative position of countries in terms of competitiveness at the destination country. The negative coefficients for this variable indicate that inflationary trends of import prices reduce bilateral trade.[4, 5] The model proposed implies that internal demand drives trade flows. This results in a gravity equation including the share of domestic income that is spent in the sector at destination, and whose empirical approximation is sectoral GVA, representing market size. The results show that it contributes to increase economic relations, as expected.

Next, besides institutional quality, trade barriers depend on distance, sharing borders, common language, colonial links, and regional trade agreements. Geographical distance is used as an approximation of transport (physical) costs, as defended by Limao and Venables (2001), Combes and Lafourcade (2005), and Zofío et al. (2014). Our results confirm that geographical distance influence trade flows. Our distance elasticities are around -0.5, which is lower than the -0.93 and the -0.91 reported by Disdier and Head (2008) and Head and

[4] Indeed, the price index (5) is homogenous of degree $(1-\sigma)^2$ in prices; therefore, if individual country prices increase proportionally the aggregate index increases according to that degree.

[5] Several authors propose different estimation methods when multilateral resistance terms are unobserved (e.g., Rose and van Wincoop, 2001; Redding and Venables, 2004; Feenstra, 2004; Baier and Bergstrand, 2009).

Mayer (2013), respectively, but this may be a result of our use of a wider sample, covering a larger number of countries over a longer time period. Additionally, Blaney and Neaves (2013) offer more conclusive empirical evidence about the declining effect of distance in the context of gravity equations, both in cross-section and time-series (panel) estimations. Contiguity (border) and cultural proximity represented by common language display very similar positive values, with coefficients around 0.7 and 0.3, respectively. With respect to colonial bonds, they turn out to be non-significant, probably because their effect tends to be captured by common language, a variable with which it correlates when capturing cultural ties.[6] Regional trade agreements also facilitate trade, with significant coefficients above 0.7.

Focusing now on our variables of interest, we find that *all* institutional indicators display significant coefficients with the expected sign. The strongest connection with bilateral trade volumes are exhibited by *regulatory quality*, *government effectiveness*, and *rule of law*. This is in line with studies signalling that market competition, legal security, and corruption are some of the most serious concerns in economic relations, conditioning economic growth and hampering trade. Such is the case of Yu at el. (2015), who remark the importance of institutional quality, or Anderson and Marcouiller (2002) and Jansen and Nordas (2004), stressing the role of corruption as a fundamental impediment to trade. In Yu et al (2015), considering only the lagged *rule of law* indicator, these authors obtain a similar positive effect on trade, although for a less complete sample of 16 European countries during a shorter period of time (1996-2009). Therefore, our results shows the importance of this institutional indicator as a trade barrier at destination, and whose robustness is confirmed with our current dataset including more countries in different stages of development, and a longer period. Also, including two additional indicators at origin and destination—this time without lags: *Government effectiveness* and *control of corruption*, Jansen and Nordas (2004) also validate the importance of institutions at destination. It worth noting that their results suggest a larger effect of institutional quality with respect to the usual regressors, except when they include transport infrastructure. Hence, they can be considered as substitutes. Alternative specifications with different indicators of institutional quality yield analogous results. This is the case of Anderson and Marcouiller (2002), who consider an import demand equation and rely on data on the level of two sets of indicators: *Transparency* and

[6] Tadesse and White (2010) find that cultural distances contribute to reduce trade based on data for US State level exports to 75 countries. As in several studies, the inclusion of both common language and colonial links are intended to test if both variables are able capture different aspects of cultural proximity on trade.

enforceability, compiled by the World Economic Forum (WEF). When compared to this literature, our results confirm that improving institutional quality in importing countries favours trade, while the intensity of the positive effect depends on the sample selection and dissimilarities between economies considered.

Table 2: The influence of institutions in the importing country on tangible trade

	Tangible					
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Control of corruption	0.191***					
$(I^{l}_{j,t-1})$	(5.590)					
Government effectiveness		0.287***				
$(I^{l}_{j,t-1})$		(7.196)				
Political stability			0.193***			
$(I^{l}_{j,t-1})$			(5.661)			
Rule of law				0.219***		
$(I^{l}_{j,t-1})$				(5.659)		
Regulatory quality					0.325***	
$(I^{l}_{j,t-1})$					(6.828)	
Voice and accountability						0.138***
$(I^{l}_{j,t-1})$						(5.047)
Distance	-0.501***	-0.493***	-0.501***	-0.496***	-0.505***	-0.519***
(lnd_{ij})	(-8.740)	(-8.565)	(-8.868)	(-8.580)	(-8.872)	(-9.397)
Contiguity	0.750***	0.774***	0.704***	0.761***	0.768***	0.717***
$(cont_{ij})$	(4.754)	(4.882)	(4.553)	(4.813)	(4.925)	(4.805)
Common language	0.322**	0.299**	0.380***	0.327**	0.310**	0.387***
(lan_{ij})	(2.252)	(2.121)	(2.608)	(2.269)	(2.231)	(2.593)
Colonial links	0.176	0.171	0.172	0.159	0.141	0.137
$(colink_{ij})$	(1.567)	(1.525)	(1.535)	(1.417)	(1.266)	(1.219)
Regional trade agreement	0.581***	0.557***	0.620***	0.585***	0.534***	0.581***
(rta_{ijt})	(6.527)	(6.256)	(7.120)	(6.424)	(6.032)	(6.489)
Labour competitiv. in	0.629***	0.618***	0.639***	0.633***	0.628***	0.635***
origin (exporter) $(\ln(c_i w_i))$	(15.58)	(15.07)	(16.93)	(16.95)	(16.09)	(16.98)
Tangible price at destination	-0.604***	-0.468***	-0.751***	-0.530***	-0.385***	-0.710***
(importer) (lnP_{sjt})	(-5.195)	(-4.041)	(-6.132)	(-4.364)	(-3.645)	(-5.125)
GVA tangible at destination	0.778***	0.757***	0.800***	0.770***	0.762***	0.795***
(importer) $(\ln(\mu_{sjt} w_{tj} L_{jt}))$	(26.93)	(25.80)	(29.77)	(26.65)	(26.04)	(29.68)
Constant	-3.188***	-3.156***	-3.326***	-3.201***	-3.098***	-3.078***
	(-3.755)	(-3.688)	(-3.885)	(-3.782)	(-3.652)	(-3.745)
Exporter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178,129	178,129	178,129	178,129	178,129	178,129
R-squared	0.753	0.757	0.756	0.756	0.759	0.758

Note: Poisson pseudo-maximum-likelihood (PPML) estimations. Exporter-importer clustered standard errors. t-statistic in parenthesis. *** p<0.01, **p<0.05, *p<0.1.

The estimation results focusing on the institutional distance between importer and exporter, rather than just the level of institutional quality at destination, are presented in Table 3. All institutional variables are calculated as the *difference* between the value of the indicator in the country of destination and that of origin. The coefficients are very similar to those previously obtained with the indicators in levels at the importing country, including those corresponding to the control variables. The variables representing labour competitiveness, multilateral price term and market size show the expected signs with values similar to the foregoing specification. One more time, bilateral flows are negatively affected by distance, while contiguity, common language and regional trade agreements are associated with increases in trade. Again, colonial links are non-significant for all specifications.

All six distance governance indicators are statistically significant and positive. As a positive (negative) value of the indicator implies that institutional quality in the importing country is larger (smaller) than in the exporting country, the positive sign of the coefficients thus implies that a larger difference in favour of the importing country fosters trade, while the opposite is observed when the exporter country exhibits stronger institutions than its partner. Indeed the larger the positive (negative) value of these differences, the larger the increase (reduction) in associated trade. These results imply that similar levels of institutional quality between the importing and exporting country do not affect trade. A greater familiarity with the institutional environment reduces transaction costs and increases trade when the importing country has the upper hand, but, if the difference is in favour of the exporting country –resulting in a negative coefficient– then trade is negatively affected. This result corroborates previous findings by Yu et al. (2015) who postulate that when the formal institutions in the importing country are stronger than those of the exporting country, exporters rely less on informal ones, promoting bilateral trade. This also concurs with the fact that exporters bear the main risk of non-payment of bilateral transactions and therefore, the better the institutions in the importing country, the lower the risk and uncertainty.

Table 3: The influence of institutional distance between exporting and importing countries on tangible trade

	Tangible					
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Control of corruption	0.187***					
$(I^{d}_{ij,t-1})$	(5.623)					
Government effectiveness		0.278***				
$(I^{d}_{ij,t-1})$		(7.198)				
Political stability			0.172***			
$(I^{d}_{ij,t-1})$			(5.399)			
Rule of law				0.216***		
$(I^{d}_{ij,t-1})$				(5.682)		
Regulatory quality					0.311***	
$(I^{d}_{ij,t-1})$					(6.730)	
Voice and accountability						0.136***
$(I^{d}_{ij,t-1})$						(5.058)
Distance	-0.502***	-0.494***	-0.504***	-0.496***	-0.506***	-0.519***
(lnd_{ij})	(-8.762)	(-8.577)	(-9.009)	(-8.586)	(-8.911)	(-9.399)
Contiguity	0.748***	0.770***	0.701***	0.761***	0.765***	0.717***
$(cont_{ij})$	(4.753)	(4.872)	(4.581)	(4.818)	(4.916)	(4.807)
Common language	0.323**	0.301**	0.382***	0.329**	0.314**	0.387***
(lan_{ij})	(2.266)	(2.142)	(2.631)	(2.278)	(2.261)	(2.597)
Colonial links	0.176	0.172	0.172	0.159	0.142	0.138
$(colink_{ij})$	(1.574)	(1.534)	(1.544)	(1.416)	(1.275)	(1.221)
Regional trade agreement	0.585***	0.565***	0.621***	0.587***	0.537***	0.582***
(rta_{ijt})	(6.577)	(6.352)	(7.193)	(6.457)	(6.078)	(6.498)
Labour competitiv. in	0.634***	0.653***	0.641***	0.640***	0.647***	0.628***
origin (exporter) $(\ln(c_i w_i))$	(16.22)	(16.85)	(17.08)	(17.55)	(16.83)	(17.21)
Tangible price at destination	-0.612***	-0.481***	-0.781***	-0.536***	-0.415***	-0.712***
(importer) (lnP_{sjt})	(-5.278)	(-4.155)	(-6.386)	(-4.466)	(-3.965)	(-5.156)
GVA tangible at destination	0.778***	0.759***	0.801***	0.771***	0.763***	0.795***
(importer) $(\ln(\mu_{sjt} w_{tj} L_{jt}))$	(27.07)	(25.95)	(29.77)	(26.72)	(26.13)	(29.69)
Constant	-3.502***	-3.826***	-3.723***	-3.696***	-3.725***	-3.209***
	(-4.131)	(-4.417)	(-4.395)	(-4.343)	(-4.336)	(-3.913)
Exporter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178,129	178,129	178,129	178,129	178,129	178,129
R-squared	0.752	0.755	0.757	0.756	0.758	0.757

Note: Poisson pseudo-maximum-likelihood (PPML) estimations. Exporter-importer clustered standard errors. t-statistic in parenthesis. *** p<0.01, **p<0.05, *p<0.1.

Finally, in light of the similarity in the coefficients between institutional levels and differences–which is also consistent for all sectors, as reported in the following sections–it can be argued that the variable defined as the difference in institutional levels $I^{d}_{ijk,t-1}$ represents mostly a translation of institutional quality at destination $I^{l}_{jk,t-1}$. The change

from levels to distance fundamentally affects the intercepts and individual fixed effects, but not the value of the coefficients, when normally changes in scale, such as measurement units, alter the coefficients but not the intercepts. A result that is confirmed by the high pairwise correlation between the institutional variables in levels and differences, whose value is around 0.75.

4.2 Change in the impact of geographical distance and institutional barriers

A second research question of the study refers to whether the role of institutional quality for trade has been increasing over time. We address it by examining the stability of the coefficients associated to both geographical and institutional distance by means of interacting the institutional indicators with time dummies. In this way we can compute the marginal effects of the institutional variables for every year. This type of analysis can be then transformed into annual figures, facilitating the visual inspection of the association between each variable and trade over time.

Figure 1 shows the evolution of the coefficients estimating the association of geographical distance with bilateral trade. The outcome is a relatively stable relationship between both factors over time. A negligible decline in the effect of distance in the first decade of the 21st century is observed. However, the results of the analysis point to a strong persistence of a negative impact of geographical distance on trade, as reported in the literature (e.g., Blaney and Neaves, 2013; Disdier and Head, 2008). Explanations for the persistent effect of this type of distance can be found in the composition of trade. In a large number of countries, trade is dominated by industries where geographical distance still heavily determines costs.[7] It may also be the case, as hypothesized by Duranton and Storper (2008), that greater trade in more sophisticated goods with higher transaction costs may offset the effects of a decline in transport costs.

[7] Chaney (2013) assesses the theoretical effect of distance from the perspective of the emergence of stable network of input-output linkages between firms. He shows that if the distribution of firm sizes is well approximated by Zipf's law and larger firms export over longer distances on average, then aggregate trade is inversely proportional to distance.

Figure 1: Evolution of the impact of geographical distance

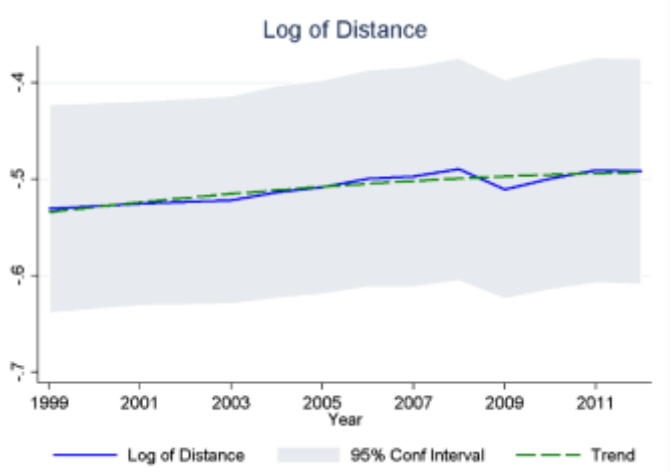


Figure 2 presents the evolution of the coefficients of institutional quality at destination and Figure 3 displays the values of those corresponding to the institutional distance between importer and exporter. Given rising trade levels, a growing connection between institutional quality and bilateral trade over time can be expected. The results, indeed, show this trend for most indicators of institutional quality at destination. The graphs in Figure 2 display an upward sloping trend throughout the period. In spite of some decline in the dimension of the coefficients in the last years, the overall trajectory indicates a larger relevance of institutional factors at destination, at least until the outbreak of the crisis. The increasing role of institutional distance takes place even in the face of the commodity boom of the 2000s, which facilitated trade in raw materials, badly needed for industrial production in emerging and developed and emerging countries alike and often sourced from countries with weaker institutions—as confirmed in the following section. The revival of the role of institutions is observed throughout the whole period, reflecting the rapid rise of new players in trade, such as China, that despite starting from a relatively low level of institutional quality, have made considerable progress over recent years. The fact that importing countries have also frequently adopted a *realpolitik* attitude towards trade in energy sources and raw materials – which has at times implied turning a blind eye on exporting countries' internal affairs and on local labour rights – has not prevented institutions from gradually playing a more important role in determining trade flows. Finally, it is worth noting that the increasing influence of institutional quality takes place during a period when the institutional quality has tended to decline (with the exception of the realm of *voice and accountability*) (Table 1), particularly in regions of the world that were relatively open to trade in previous years and which have witnessed an increase in trade

flows. The greatest increase in the role of the institutions of the importing country for trade concern *government effectiveness* and *political stability*, whose coefficients increase from 0.23 and 0.14 in 1999 to 0.32 and 0.22 in 2012, respectively. At the opposite end, the connection between *regulatory quality* and trade barely changed during the period of analysis.

As for institutional distance between the importing and exporting country, the positive coefficients of Figure 3 imply that countries with better institutions enjoy the upper hand in trade – as the higher positive (negative) value of the indicator, the larger the institutional distance in favour of the importing (exporting) country. More bilateral trade takes place when the importing country has stronger institutions. Weaker institutions in the importing country – or, symmetrically, stronger institutions in the exporting country – result in lower bilateral trade volumes. Most institutional distance coefficients displayed in Table 3 adopt a moderately inverted U-shaped curve, with the upward trend often reverting from around 2005. Over the whole period of analysis, the influence of institutional distance on trade remains non-linear, but mostly neutral. This non-linearity and neutrality is particularly pronounced for *control of corruption*, *regulatory quality*, and *voice and accountability*.

Figure 2: Evolution of the impact of institutions in the importing country.

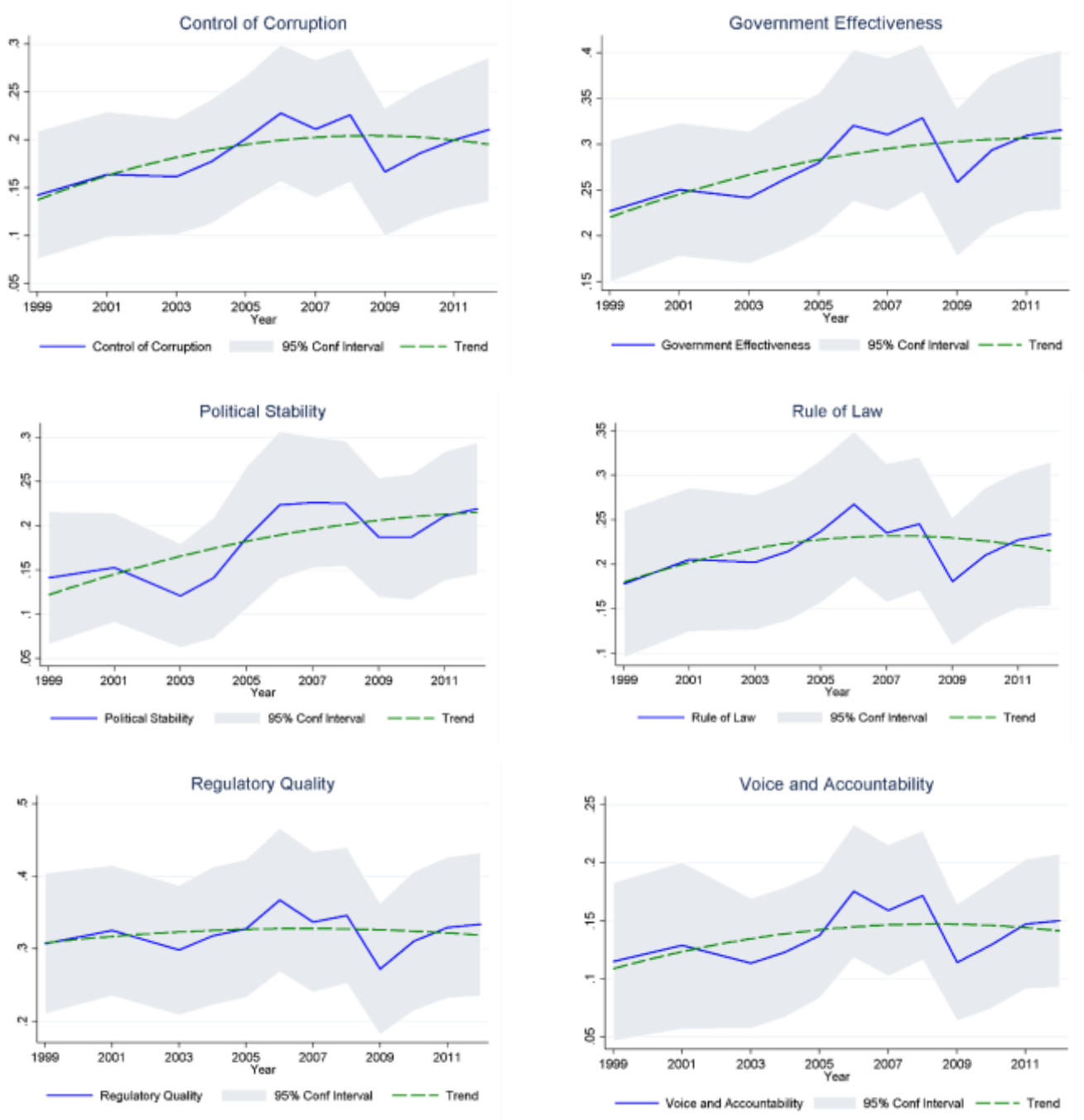
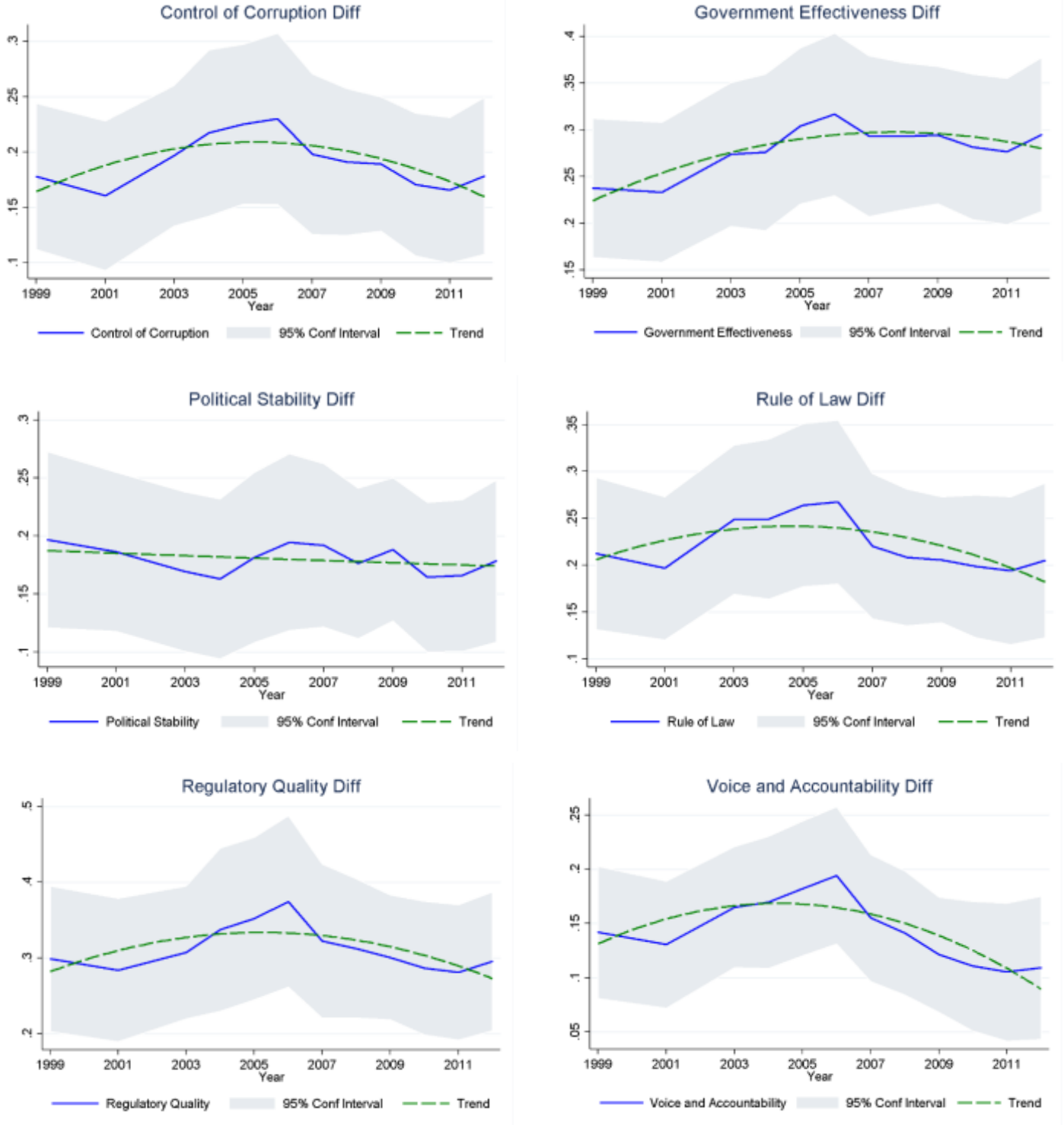


Figure 3: Evolution of the impact of institutional distance indicators between exporting and importing countries



4.3 Sector sensitivity to institutions

To account for the sectoral dimension of trade, and assess the robustness of previous results, we further perform a series of equivalent regressions considering the primary, industry and service sectors, and compare the new results with those reported for overall trade. Sector-specific results are compared to the aggregate trade benchmark (Tables 2 and 3). For each sector we systematically compare the variables corresponding to: a) the theoretical model determinants: labour competitiveness (productivity) of the exporting country and the price index and market size, both in the importing country; b) the control variables – distance, contiguity, cultural ties and regional trade agreements; and, finally, c) the institutional quality indicators. For each pairwise comparison we highlight the most relevant differences and commonalities across sectors.

Tables 4 and 5 show the results estimating the gravity equation (10) for trade in the *primary sector (agriculture and natural resources)*, including trade barriers in levels and differences, respectively (eq. 11). The different variables in the gravity equation present the expected signs and are statistically significant. Regarding the trade determinants, labour competiveness plays a lesser role in the primary sector than on average for all tangible goods (Table 2). Indeed, the estimated coefficients are about half those previously estimated (about 0.3 vs. 0.6). Given the level of agricultural mechanization and its lower cost share in production, labour does not drive export competitiveness to the same extent as in other tangibles, particularly manufacturing (Tables 6 and 7). The values are also about one fourth lower than those observed for services. The results for the effects of the sectoral price index and market size at destination do not change with respect to the benchmark, regardless the institutional indicator considered. Sectoral price index, in particular, presents a large variability depending on the institutional factor considered (-0.278 for *rule of law* and -0.585 for *voice and accountability*).

As for trade controls, distance plays a larger negative role for trade. The border effect represented by contiguity does not change, and the significance of the two variables capturing cultural ties changes: colonial links become significant, while common language turns insignificant. These results substantiate those of Santos Silva and Tenreyro (2006), who convey that common language and colonial links are significant and non-significant for trade, respectively. Contiguity or border effects and trade agreements remain significant.

Finally, the influence of institutional quality at destination on trade in agricultural goods and natural resources greatly differs from the aggregate benchmark. The quality of institutions leads to greater increases in trade in the primary sector than for the benchmark as well as for manufacturing and services. Given the importance of institutions for bilateral trade in this sector, the results justify proposals such as the Extractive Industries Transparency Initiative (EITI) that, from 2003 onwards, has promoted a more open and accountable management of extractive resources, addressing relevant governance issues in the oil, gas and mining sector. This initiative has already been adopted by 51 countries. Our results indicate that the more successful this initiative becomes in increasing governance quality, the larger the potential benefit terms of increases in trade. Indeed, the coefficients of the institutional indicators display similar values to those of regional trade agreements, which is a remarkable result giving the importance of the latter in gravity studies. Economic integration, thus, seems to go hand by hand with institutional harmonization (e.g., the previously mentioned EITI). To the extent that regional trade agreements lower trade barriers as tariffs increases them, our results complement those of Anderson and Marcouiller (2002) and François and Manchin (2013). Hence, recent increases in protectionism – such as the U.S. withdrawal from the Trans-Pacific Partnership, imposing new tariffs and demanding a renegotiation of NAFTA or the Brexit process – can only be compensated by significant increases in institutional quality, particularly, in *regulatory quality* and *government effectiveness*, which exhibit the greatest effects. *Voice and accountability* is by contrast the least relevant.

Table 5 qualifies the previous results by considering institutional distance. Changes in the coefficients are marginal for tangibles: only labour competiveness adopts higher values than the benchmark. The values increase by one third larger with respect to the regressions considering institutional levels at destination. The values of the constant and the fixed effects also differ between both institutional specifications in levels and differences.

Table 4: The influence of institutions in the importing country on primary trade

	Agriculture and natural resources					
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Control of corruption	0.442***					
$(I^{l}_{j,t-1})$	(12.43)					
Government effectiveness		0.546***				
$(I^{l}_{j,t-1})$		(13.96)				
Political stability			0.476***			
$(I^{l}_{j,t-1})$			(8.875)			
Rule of law				0.496***		
$(I^{l}_{j,t-1})$				(11.36)		
Regulatory quality					0.556***	
$(I^{l}_{j,t-1})$					(13.70)	
Voice and accountability						0.329***
$(I^{l}_{j,t-1})$						(7.105)
Distance	-0.746***	-0.752***	-0.783***	-0.743***	-0.766***	-0.794***
(lnd_{ij})	(-10.19)	(-10.58)	(-10.88)	(-9.880)	(-11.11)	(-12.15)
Contiguity	0.549***	0.571***	0.428**	0.579***	0.559***	0.462***
$(cont_{ij})$	(2.848)	(3.056)	(2.198)	(2.940)	(3.148)	(2.623)
Common language	-0.214	-0.206	-0.0787	-0.194	-0.183	-0.123
(lan_{ij})	(-1.238)	(-1.233)	(-0.488)	(-1.108)	(-1.114)	(-0.782)
Colonial links	0.620***	0.590***	0.690***	0.577***	0.541***	0.572***
$(colink_{ij})$	(3.482)	(3.274)	(4.234)	(3.209)	(3.038)	(3.247)
Regional trade agreement	0.309***	0.260**	0.346***	0.297**	0.241**	0.322***
(rta_{ijt})	(2.711)	(2.349)	(3.196)	(2.455)	(2.289)	(3.303)
Labour competitiv. in	0.291***	0.270***	0.323***	0.293***	0.280***	0.314***
origin (exporter) $(ln(c_i w_i))$	(3.392)	(3.187)	(3.955)	(3.734)	(3.425)	(3.801)
Agricult. price at destination	-0.412***	-0.373***	-0.677***	-0.278*	-0.285**	-0.585***
(importer) (lnP_{sjt})	(-2.846)	(-2.688)	(-4.827)	(-1.844)	(-2.027)	(-4.927)
GVA Agricult. at destination	0.728***	0.692***	0.781***	0.711***	0.713***	0.764***
(importer) $(ln(\mu_{sjt} w_{tj} L_{jt}))$	(20.50)	(20.11)	(24.23)	(20.30)	(20.14)	(20.24)
Constant	2.390**	2.569**	2.559**	2.389**	2.595***	2.698***
	(2.374)	(2.568)	(2.556)	(2.468)	(2.707)	(2.987)
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178,129	178,129	178,129	178,129	178,129	178,129
R-squared	0.570	0.582	0.583	0.570	0.586	0.581

Note: Poisson pseudo-maximum-likelihood (PPML) estimations. Exporter-importer clustered standard errors. t-statistic in parenthesis. *** p<0.01, **p<0.05, *p<0.1.

Table 5: The influence of institutional distance between exporting and importing countries on primary trade

	Agriculture and natural resources					
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Control of corruption	0.435***					
$(I^d_{ij,t-1})$	(12.49)					
Government effectiveness		0.538***				
$(I^d_{ij,t-1})$		(14.06)				
Political stability			0.426***			
$(I^d_{ij,t-1})$			(8.825)			
Rule of law				0.489***		
$(I^d_{ij,t-1})$				(11.32)		
Regulatory quality					0.545***	
$(I^d_{ij,t-1})$					(13.84)	
Voice and accountability						0.321***
$(I^d_{ij,t-1})$						(7.111)
Distance	-0.748***	-0.753***	-0.791***	-0.744***	-0.766***	-0.796***
(lnd_{ij})	(-10.25)	(-10.61)	(-11.20)	(-9.932)	(-11.15)	(-12.19)
Contiguity	0.545***	0.565***	0.421**	0.577***	0.556***	0.460***
$(cont_{ij})$	(2.837)	(3.031)	(2.200)	(2.939)	(3.135)	(2.616)
Common language	-0.211	-0.205	-0.0753	-0.191	-0.180	-0.122
(lan_{ij})	(-1.231)	(-1.226)	(-0.476)	(-1.096)	(-1.100)	(-0.774)
Colonial links	0.621***	0.591***	0.687***	0.577***	0.543***	0.574***
$(colink_{ij})$	(3.511)	(3.298)	(4.220)	(3.208)	(3.062)	(3.269)
Regional trade agreement	0.311***	0.269**	0.351***	0.296**	0.247**	0.323***
(rta_{ijt})	(2.739)	(2.446)	(3.324)	(2.456)	(2.363)	(3.318)
Labour competitiv. in	0.378***	0.408***	0.374***	0.367***	0.435***	0.349***
origin (exporter) $(\ln(c_i w_i))$	(4.151)	(4.867)	(4.207)	(4.450)	(4.944)	(4.005)
Agricult. price at destination	-0.420***	-0.369***	-0.709***	-0.296**	-0.311**	-0.594***
(importer) (lnP_{sjt})	(-2.907)	(-2.662)	(-5.058)	(-1.980)	(-2.215)	(-4.988)
GVA Agricult. at destination	0.729***	0.693***	0.777***	0.711***	0.713***	0.764***
(importer) $(\ln(\mu_{sjt} w_{tj} L_{jt}))$	(20.57)	(20.19)	(24.27)	(20.30)	(20.20)	(20.31)
Constant	1.142	0.844	1.265	0.917	0.687	2.029**
	(1.088)	(0.857)	(1.243)	(0.941)	(0.691)	(2.148)
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178,129	178,129	178,129	178,129	178,129	178,129
R-squared	0.567	0.581	0.583	0.571	0.585	0.581

Note: Poisson pseudo-maximum-likelihood (PPML) estimations. Exporter-importer clustered standard errors. t-statistic in parenthesis. *** p<0.01, **p<0.05, *p<0.1.

Tables 6 and 7 present the regressions for bilateral trade in the *industry sector*. In this case – and as expected – labour export competitiveness plays a larger role in explaining trade, increasing the aggregate value for tangibles from 0.3 to 0.6, with respect to those reported for the primary sector. The industry price at destination also exhibits a larger value, while market size remains virtually unchanged. The control variables capturing the border effect (0.7) and regional trade agreements (0.6) show larger effects than for the primary sector. Each of these variables compensates for the negative effect of distance (-0.5). Finally, the effect of institutional quality is much lower, with values in the range between, 0.102 for *voice and accountability*, and 0.271, for *regulatory quality* – for agriculture the range was between 0.329 and 0.556. As suggested by Yu et al. (2015), these results may be a consequence of the fact that in the context of trade in differentiated or heterogeneous goods, such as manufactures or services, importers bear a considerable part of the risk of non-payment in bilateral trade transactions. Under these circumstances, informal institutions, such as trust, are more important for trade in heterogeneous goods for which quality may be non-contractable and is also less visible for courts (Guiso et al., 2009).

From the above results it can also be concluded that the ranking of indicators across sectors is stable, and while better institutional quality in the importing country always facilitates bilateral trade, *voice and accountability*, followed by *control of corruption*, have the lowest impact. The industrial sector follows then agriculture and natural resources, indicating that improving institutional quality would facilitate trade. Hence, developing and emerging countries, where these two sectors make up the largest share of exports, will benefit from undertaking further institutional reforms aimed at improving the quality of local institutions (Méon and Sekkat, 2008). The results considering institutional distance are, once again, very similar and further corroborate the views above.

Table 6: The influence of institutions in the importing country on industry trade

	Industry					
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Control of corruption	0.149***					
$(I^{l}_{j,t-1})$	(4.219)					
Government effectiveness		0.235***				
$(I^{l}_{j,t-1})$		(5.674)				
Political stability			0.133***			
$(I^{l}_{j,t-1})$			(3.866)			
Rule of law				0.170***		
$(I^{l}_{j,t-1})$				(4.330)		
Regulatory quality					0.271***	
$(I^{l}_{j,t-1})$					(5.475)	
Voice and accountability						0.102***
$(I^{l}_{j,t-1})$						(3.662)
Distance	-0.484***	-0.477***	-0.486***	-0.480***	-0.487***	-0.499***
(lnd_{ij})	(-8.418)	(-8.219)	(-8.632)	(-8.278)	(-8.456)	(-8.971)
Contiguity	0.770***	0.792***	0.730***	0.778***	0.788***	0.741***
$(cont_{ij})$	(4.839)	(4.946)	(4.714)	(4.885)	(4.982)	(4.885)
Common language	0.354**	0.331**	0.402***	0.359**	0.340**	0.409***
(lan_{ij})	(2.517)	(2.375)	(2.794)	(2.526)	(2.469)	(2.769)
Colonial links	0.148	0.144	0.145	0.135	0.119	0.118
$(colink_{ij})$	(1.312)	(1.281)	(1.290)	(1.193)	(1.055)	(1.040)
Regional trade agreement	0.592***	0.570***	0.623***	0.596***	0.550***	0.592***
(rta_{ijt})	(6.665)	(6.394)	(7.149)	(6.598)	(6.187)	(6.602)
Labour competitiv. in	0.653***	0.644***	0.661***	0.656***	0.652***	0.658***
origin (exporter) $(\ln(c_i w_i))$	(16.34)	(15.84)	(17.22)	(17.38)	(16.90)	(17.46)
Industry price at destination	-0.609***	-0.485***	-0.731***	-0.554***	-0.423***	-0.692***
(importer) (lnP_{sjt})	(-5.543)	(-4.406)	(-6.286)	(-4.962)	(-4.169)	(-5.285)
GVA Industry at destination	0.762***	0.745***	0.780***	0.756***	0.747***	0.775***
(importer) $(\ln(\mu_{sjt} w_{tj} L_{jt}))$	(26.40)	(25.37)	(29.04)	(26.24)	(25.51)	(29.34)
Constant	-4.011***	-3.989***	-4.104***	-4.025***	-3.937***	-3.923***
	(-4.125)	(-4.082)	(-4.211)	(-4.146)	(-4.050)	(-4.104)
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178,129	178,129	178,129	178,129	178,129	178,129
R-squared	0.754	0.756	0.759	0.757	0.759	0.758

Note: Poisson pseudo-maximum-likelihood (PPML) estimations. Exporter-importer clustered standard errors.
t-statistic in parenthesis. *** p<0.01, **p<0.05, *p<0.1.

Table 7: The influence of institutional distance between exporting and importing countries on industry trade

	Industry					
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Control of corruption	0.146***					
$(I^d_{ij,t-1})$	(4.268)					
Government effectiveness		0.228***				
$(I^d_{ij,t-1})$		(5.671)				
Political stability			0.118***			
$(I^d_{ij,t-1})$			(3.675)			
Rule of law				0.168***		
$(I^d_{ij,t-1})$				(4.349)		
Regulatory quality					0.259***	
$(I^d_{ij,t-1})$					(5.387)	
Voice and accountability						0.102***
$(I^d_{ij,t-1})$						(3.686)
Distance	-0.485***	-0.477***	-0.489***	-0.480***	-0.488***	-0.499***
(lnd_{ij})	(-8.430)	(-8.229)	(-8.740)	(-8.281)	(-8.492)	(-8.968)
Contiguity	0.768***	0.788***	0.728***	0.777***	0.785***	0.741***
$(cont_{ij})$	(4.839)	(4.939)	(4.734)	(4.887)	(4.974)	(4.886)
Common language	0.355**	0.334**	0.404***	0.360**	0.344**	0.409***
(lan_{ij})	(2.525)	(2.394)	(2.812)	(2.534)	(2.495)	(2.771)
Colonial links	0.148	0.145	0.145	0.134	0.119	0.118
$(colink_{ij})$	(1.316)	(1.287)	(1.297)	(1.192)	(1.062)	(1.040)
Regional trade agreement	0.595***	0.577***	0.623***	0.597***	0.552***	0.593***
(rta_{ijt})	(6.698)	(6.471)	(7.197)	(6.624)	(6.223)	(6.605)
Labour competitiv. in	0.655***	0.671***	0.661***	0.661***	0.665***	0.652***
origin (exporter) $(\ln(c_i w_i))$	(16.94)	(17.45)	(17.33)	(17.87)	(17.55)	(17.71)
Industry price at destination	-0.613***	-0.495***	-0.752***	-0.559***	-0.446***	-0.692***
(importer) (lnP_{sjt})	(-5.590)	(-4.505)	(-6.446)	(-5.048)	(-4.426)	(-5.304)
GVA Industry at destination	0.763***	0.747***	0.781***	0.757***	0.748***	0.776***
(importer) $(\ln(\mu_{sjt} w_{tj} L_{jt}))$	(26.54)	(25.53)	(29.07)	(26.31)	(25.60)	(29.35)
Constant	-4.248***	-4.530***	-4.370***	-4.403***	-4.442***	-4.017***
	(-4.367)	(-4.583)	(-4.500)	(-4.502)	(-4.518)	(-4.208)
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178,129	178,129	178,129	178,129	178,129	178,129
R-squared	0.754	0.755	0.759	0.757	0.758	0.758

Note: Poisson pseudo-maximum-likelihood (PPML) estimations. Exporter-importer clustered standard errors. t-statistic in parenthesis. *** p<0.01, **p<0.05, *p<0.1.

Restricted data availability for trade in *services* drastically reduces the sample to 30,661 observations over the period between 2000 and 2012. These changes, along with the different nature of trade in services, result in important variations in the estimates reported in Tables 8 and 9, relative to trade in the primary and manufacturing sectors. These changes mainly affect the control variables, with a reversal in significance for the highly interrelated contiguity and regional trade agreements, whose values lose statistical significant in all regressions. These results confirm recent studies arguing that trade in services is not as dependent on vicinity as trade in tangibles. And while service production requires the agreement, co-operation and active participation of consumers (Hill, 1999) as well as a close interaction between exporters and importers, this "proximity burden" is not as physical as it may seem. Physical distance for trade in services can be compensated by a greater use of information and telecommunication technologies that characterize the digital age. Nevertheless, distance and common language still exhibit relevant and significant coefficients, rejecting the "end of distance" and "cultural proximity irrelevance" hypotheses (e.g. Tadesse and White, 2010).

Some controls, however, remain relevant. Labour competitiveness, sectoral price and market share shape trade in services in a similar way to trade in tangibles. The results in Tables 8 and 9 also show that institutional quality is a relevant factor for trade in services. Here, the ranking of indicators mirrors those already discussed, although the coefficient for *voice and accountability* becomes negligible and loses, for the first time, statistical significance.

Table 8: The influence of institutions in the importing country on services trade

	Services					
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Control of corruption	0.186***					
$(I^{l}_{j,t-1})$	(4.288)					
Government effectiveness		0.223***				
$(I^{l}_{j,t-1})$		(4.037)				
Political stability			0.200***			
$(I^{l}_{j,t-1})$			(4.181)			
Rule of law				0.201***		
$(I^{l}_{j,t-1})$				(3.704)		
Regulatory quality					0.287***	
$(I^{l}_{j,t-1})$					(4.710)	
Voice and accountability						0.0524
$(I^{l}_{j,t-1})$						(1.079)
Distance	-0.456***	-0.461***	-0.465***	-0.453***	-0.457***	-0.491***
(lnd_{ij})	(-8.101)	(-8.184)	(-8.140)	(-8.007)	(-8.271)	(-9.565)
Contiguity	0.143	0.139	0.0593	0.152	0.174	0.0735
$(cont_{ij})$	(0.805)	(0.795)	(0.332)	(0.852)	(1.025)	(0.467)
Common language	0.407***	0.408***	0.472***	0.414***	0.392***	0.489***
(lan_{ij})	(2.903)	(2.909)	(3.431)	(2.966)	(2.827)	(3.588)
Colonial links	0.375***	0.369**	0.401***	0.360**	0.340**	0.342**
$(colink_{ij})$	(2.622)	(2.536)	(2.877)	(2.486)	(2.371)	(2.346)
Regional trade agreement	0.185	0.178	0.233*	0.190	0.144	0.196
(rta_{ijt})	(1.483)	(1.444)	(1.956)	(1.500)	(1.139)	(1.582)
Labour competitiv. in	0.395***	0.383***	0.382***	0.387***	0.391***	0.386***
origin (exporter) $(\ln(c_i w_i))$	(5.468)	(5.207)	(5.091)	(5.358)	(5.392)	(5.261)
Services price at destination	-0.367*	-0.350*	-0.454**	-0.312	-0.226	-0.600***
(importer) (lnP_{sjt})	(-1.772)	(-1.655)	(-2.276)	(-1.447)	(-1.135)	(-3.520)
GVA Services at destination	0.682***	0.677***	0.708***	0.676***	0.670***	0.706***
(importer) $(\ln(\mu_{sjt} w_{tj} L_{jt}))$	(27.66)	(26.95)	(31.61)	(26.69)	(26.11)	(29.04)
Constant	-1.122	-0.998	-1.036	-1.003	-1.059	-0.826
	(-1.152)	(-1.017)	(-1.087)	(-1.026)	(-1.096)	(-0.894)
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,724	30,724	30,724	30,724	30,724	30,724
R-squared	0.777	0.779	0.783	0.778	0.781	0.788

Note: Poisson pseudo-maximum-likelihood (PPML) estimations. Exporter-importer clustered standard errors.
t-statistic in parenthesis. *** p<0.01, **p<0.05, *p<0.1.

Table 9: The influence of institutional distance between exporting and importing countries on services trade

	Services					
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Control of corruption	0.177***					
$(I^d_{ij,t-1})$	(4.274)					
Government effectiveness		0.209***				
$(I^d_{ij,t-1})$		(3.997)				
Political stability			0.176***			
$(I^d_{ij,t-1})$			(3.996)			
Rule of law				0.197***		
$(I^d_{ij,t-1})$				(3.686)		
Regulatory quality					0.276***	
$(I^d_{ij,t-1})$					(4.732)	
Voice and accountability						0.0517
$(I^d_{ij,t-1})$						(1.076)
Distance	-0.458***	-0.463***	-0.469***	-0.454***	-0.458***	-0.491***
(lnd_{ij})	(-8.191)	(-8.235)	(-8.276)	(-8.032)	(-8.328)	(-9.568)
Contiguity	0.139	0.133	0.0581	0.150	0.170	0.0733
$(cont_{ij})$	(0.788)	(0.767)	(0.331)	(0.843)	(1.004)	(0.466)
Common language	0.412***	0.413***	0.476***	0.416***	0.396***	0.489***
(lan_{ij})	(2.955)	(2.954)	(3.463)	(2.981)	(2.867)	(3.593)
Colonial links	0.374***	0.368**	0.394***	0.359**	0.340**	0.342**
$(colink_{ij})$	(2.619)	(2.536)	(2.812)	(2.485)	(2.374)	(2.346)
Regional trade agreement	0.186	0.182	0.232*	0.191	0.146	0.196
(rta_{ijt})	(1.503)	(1.483)	(1.958)	(1.510)	(1.159)	(1.582)
Labour competitiv. in	0.450***	0.376***	0.379***	0.375***	0.383***	0.388***
origin (exporter) $(\ln(c_i w_i))$	(5.963)	(4.663)	(4.837)	(5.063)	(4.847)	(5.279)
Services price at destination	-0.392*	-0.368*	-0.476**	-0.321	-0.248	-0.602***
(importer) (lnP_{sjt})	(-1.909)	(-1.750)	(-2.404)	(-1.495)	(-1.251)	(-3.531)
GVA Services at destination	0.683***	0.680***	0.708***	0.677***	0.672***	0.706***
(importer) $(\ln(\mu_{sjt} w_{tj} L_{jt}))$	(27.74)	(27.16)	(31.61)	(26.76)	(26.21)	(29.03)
Constant	-1.650*	-1.054	-1.098	-1.108	-1.139	-0.893
	(-1.715)	(-1.047)	(-1.144)	(-1.140)	(-1.159)	(-0.981)
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,724	30,724	30,724	30,724	30,724	30,724
R-squared	0.777	0.779	0.784	0.778	0.780	0.787

Note: Poisson pseudo-maximum-likelihood (PPML) estimations. Exporter-importer clustered standard errors. t-statistic in parenthesis. *** p<0.01, **p<0.05, *p<0.1.

5. Conclusions

This paper has explored the extent to which institutional quality affects aggregate as well as sectoral bilateral trade across the majority of countries in the world. It has also delved into the question of whether the role of institutions for trade has been waxing or waning over the last two decades.

The model used in the paper relies on the new trade theory model of multiple countries and sectors (Behrens and Ottaviano, 2009; Barbero et al., 2015), which allows us to derive a suitable—sector specific—gravity equation. This gravity equation is used to study how institutional conditions in levels for the importing country as well as the institutional distance between countries, affects bilateral trade. In particular, we assess the role of institutions for trade, controlling for geographical distance, cultural proximity, regional trade agreements, and accounting for model economic determinants related to labour cost competitiveness in origin (involving productivity and wages), trade costs, sectoral prices, and income shares at destination. All controls display the expected signs and significance at the aggregate and sectoral levels.

The results of the analysis confirm the hypothesis that institutional quality influence trade, regardless of whether the institutional quality of the importing country or the institutional distance between the exporting and importing countries is considered. With the only exception of trade in services, all institutional variables included in the analysis are closely and positively connected to trade trends. Better institutional quality in the importing country eases bilateral trade and this result is reinforced when the institutional distance with the exporter increases in favour of the importing country. The results confirm the hypothesis that it is easier to trade with partners with better institutions.

However, our results also point to the fact that the influence of institutional quality on bilateral trade is still a fraction of the capacity of other factors to affect exchanges between countries. While there is high variability in the effect of individual institutional indicators on the value of bilateral trade, their numerical coefficients tend to be systematically lower than those of more traditional trade factors, such as labour export competitiveness, price level at destination, and market share. The only exception is the agricultural sector, where institutions display the largest effect, showing the potential benefits of strengthening institutions in countries largely dependent on trade specialization in the primary sector, given their scarce factor endowments beyond natural resources. The extraction of natural

resources can be an important source of economic growth and social development. However, when poorly managed because of weak local institutional conditions, natural resource extraction has too often resulted in corruption and conflict. Our results indicate that better *regulatory quality* and *government effectiveness* in the management of agriculture and natural resource wealth can trigger an increase in much needed bilateral trade among developing countries. Finally, the ranking of institutional quality indicators is extremely robust, with *regulatory quality* exhibiting the highest effect on trade and *voice and accountability*, the lowest. In general, institutional quality fosters bilateral trade and, from a dynamic perspective, the effect of institutional quality on trade has waxed rather than waned with time.

Overall, the results of the analysis are of particular relevance for developing economies. Their trade specialization in agricultural produce and raw materials, ultimately influenced by different economic factors (e.g. endowments, wages and relative productivities), is unavoidable in the first stages of economic development, but it can be compensated and re-adjusted in the short-run by institutional factors. Indeed, while geographical location (transport infrastructure) or factor endowments will undoubtedly continue to matter for trade, the margin of improvement in these areas is bound to be limited, particularly at a time when protectionism is finding a growing number of advocates among decision makers. The capacity of improvements in institutional quality in most emerging and developing countries to fuel greater trade remains, by contrast, still large. Hence, the chances of greater economic dynamism in a more integrated global economy will necessarily require better quality institutions and policies across most of the developing world as the path for greater prosperity.

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