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Trade and Institutional Distance[1]

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Abstract

This paper examines institutional determinants of bilateral trade in a thorough fashion, paying special attention to the issues of selecting institutional measures (using a composite measure institutional dataset 1990 – 2010), institutional endogeneity and state of the art gravity trade. In terms of the institutional focus, we emphasize that institutional distance can be an even more relevant determinant of trade than institutional quality on its own. We derive a theoretical gravity equation and test it empirically on a world panel of bilateral country trade flows for two decades. We find that not all types of institutions matter for bilateral trade to the same extent. The significant marginal effects discovered can be seen as the push factor of origin's legal institutions and the pull factor of destination's political and economic institutions. More importantly, we highlight the importance of the effect of institutional distance on trade, showing that economic distance affects trade significantly and negatively, as expected through trade costs, while political institutional distance increases trade, pointing to alternative ways of trade enhancement.

Keywords: *bilateral trade, gravity equation, institutions, institutional quality, institutional distance*

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Introduction

The aim of this paper is to examine specific aspects of institutions in international trade, where we firstly derive a theoretical gravity equation, and proceed to test it empirically, paying special attention to controlling for multilateral resistance and other endogeneity issues. We concentrate on capturing the complete formal institutional environment of a country, using a composite measure institutional dataset 1990 – 2010, which is based on theory and disaggregates formal institutional environment into legal, political and economic dimension. The added value of this paper is that it is one of the few that examines the effect of complete formal institutional environment on trade, using a comprehensive set of institutional measures derived from the theory, and that it especially concentrates on the effect of institutional distance, which is completely underrated in both theory and empirics.

Differences in institutional environments can be most salient in international trade and come to the forefront of importance in affecting those flows. If we imagine the number of informal and formal rules necessary to exchange some bushels of wheat for some bushels of corn within a country, we can only imagine the multiplied numerous of informal and formal rules necessary to do the same exchange on an international level. It is not straightforward to exchange a Chinese apple for a French pear, as the firms wanting to do the transaction come from two completely different institutional settings. The institutional efficiency which reduces transaction costs is at least as if not easily more important on the international exchange level, as it is important in domestic transactions.

We draw the importance of institutions from the fact that although neoclassical economics operates in a vacuum, where all transactions happen instantaneously and without cost, the reality is quite different and should be taken into account. Coase (1937; 1960) argued that legal rules in the form of well-defined property rights are necessary for obtaining an efficient outcome in cases with any kind of externalities, always present in the market. But transaction costs are not only a result of frictions in property rights and legal rules, since to a large extent, they are also a consequence of limited information and limitations of the human mind to process information rationally to a full degree. To alleviate such problems, laws, rules, regulations, norms, etc. have been developed, aiming at reducing the resulting transaction costs. These rules of the game (North, 1990; 1993) should be taken into account in economic analysis in a systematic way. Showing the general approach how to do that, is also our purpose. “It makes little sense for economists to discuss the process of exchange without specifying the institutional setting within which the trading takes place, since this affects the incentives to produce and the costs of transacting” (Coase, 2005, p. 37).

We find that not all institutions matter for trade to the same extent, and that the institutional distance is indeed important. We find there is a push factor, the origin country's quality of legal institutions, and pull factors, the destination country's quality of political and economic institutions, which all enhance trade at the margin. On the other hand, origin's political and economic institutions revert trade on the margin. Political and economic institutional distance is also found to be very important, having a positive and a negative marginal effect, respectively.

Section 1 of this paper presents the literature in the field of trade and institutions. Section 2 sets up the theoretical framework, and Section 3 proposes an empirical specification and identification of the research question at hand. Section 4 presents and discusses the empirical results, and the last Section concludes and summarizes the findings.

1. Literature Review on Trade and Institutions

Institutions are important because they matter for growth and can account for cross country income levels differences (Hall and Jones, 1999; Acemoglu et al., 2001; Easterly and Levine, 2003). There is a body of work linking together the literature dealing with geographical and institutional determinants and growth (or income differences) on the one side, and on the other, a more specific body of literature deals directly with the effect of institutions on trade, which is the focus of this paper. An overview of some of this literature is summarized in Table 1, with the most relevant paper for our topic discussed in detail below.

Cowan and Neut (2007), Levchenko (2007), and Nunn (2007) emphasize the effect of institutions on trade mainly through contract imperfectiveness directly, with a comparative advantage based on superior institutions in the institution intensive sectors or countries. This channel of influence follows also from theoretical models such as (Acemoglu et al., 2007).

They show that comparative advantage emerges from the cross-country differences in contracting institutions, as contractual incompleteness leads to the adoption of less advanced technologies.

A more general approach to institutions entails looking at a wider range of rules of the games, which can be associated with tangible and intangible transaction costs, without necessarily assigning them solely to contractual relationships or basing comparative advantages on them. Examples of such more general attempts at capturing the effect of institutions on trade include Anderson and Marcouiller (2002), de Groot et al. (2004), Belloc (2006), Berkowitz et al. (2006), with some of them in between the first and second group.

Table 1
Selected Literature on Trade and Institutions

Authors	Journal	Main institutional proxy	Conclusions	Institutional distance
Growth (or incomes), trade and institutions				
Dollar and Kraay (2003)	Journal of Monetary Economics	WB WGI	Both trade and institutions are important in the long run, but trade is more important in the short run.	no
Rodrik et al. (2004)	Journal of Economic Growth	WB WGI	Institutions are crucial for development, more so than openness or geography, their conclusion is: „Institutions rule“.	no
Bhattacharyya et al. (2009)	The Economic Record	ICRG Political risk	The interaction of institutions and trade share affects development and thus that trade share and institutions should be examined as complements.	no
Trade and institutions (focus on contract imperfective + eness)				
Cowan and Neut (2007)	Working Papers Central Bank of Chile	ICRG Political risk, Rule of Law (Fraser Institute) and Efficiency of Judiciary (Business International)	“industries with a more complex intermediate goods structure suffer a relatively larger loss of productivity in countries with poorer institutions“.	no
Levchenko (2007)	Review of Economic Studies	WB WGI	Legal institutional differences are a significant determinant of bilateral trade flows, in the sense that the import share of a particular sector (controlling for the reliance of the sector on contracting institutions) is higher for countries with better institutions.	no
Nunn (2007)	Quarterly Journal of Economics	WB WGI	Countries with good contract enforcing institutions specialize in those sectors (products) which rely on contract enforcing the most.	no
Trade and institutions (general approach)				
Anderson and Marcouiller (2002)	The Review of Economics and Statistics	Corruption and Rule of Law (World Economic Forum)	Institutions can considerably reduce international trade, if not of adequate quality.	no
de Groot et al. (2004)	Kyklos	WB WGI	Both the home and host countries’ quality of institutions matter for trade flows, and institutional homogeneity has an additional explanatory value and significantly and positively effects bilateral trade.	yes
Belloc (2006)	Journal of Economic Surveys	/	Institutions affect international trade through three channels; exchange, industrial organization process (the make or buy decision) and financial markets.	no
Berkowitz et al. (2006)	Review of Economics and Statistics	ICRG Political risk	Both the institutions of the importer as well as exporter matter. Moreover, the effect of institutions differs with regards to product (industry complexity). They find that production costs effect is stronger than the trade costs effect, and consequently, more relevant for complex products.	no

Source: Author.

Another way of looking at the two ways of including institutions into trade analysis is that institutions affect trade most directly either through influencing production costs, leading to the comparative advantage treatment of institutions and patterns of trade, or through trade costs, implying an aggregated transaction cost effects. Both approaches yield interesting findings, albeit they are answering different questions. In this paper, we focus on the second type of inclusion of institutions and focus on institutional effects on trade costs.[2]

The work by de Groot et al. (2004) is particularly salient for this paper (and also corroborated by in a more detailed framework by Inmaculada et al. (2018)), as it is one of the first applications of the idea that institutional distance, or as they call it in their paper – institutional homogeneity, must be playing an important role in bilateral trade flows. The authors explicitly research what effect a series of institutional indicators have on bilateral trade flows, when the institutions are included as trade barriers within the standard gravity model. They use bilateral trade data (both imports and exports) for the world in 1998 on a country level, and besides the common border, language, religion and colonial past dummies, use also the set of quality of governance indicators from World Bank Worldwide Governance Indicators – WB WGI (Kaufmann et al., 2002). They test both for the effect of home and host country quality of institutions, as well as the effect of institutional homogeneity. The latter is defined as a dummy variable taking the value of 1 if the countries are institutional homogenous according to a criteria (the institutional distance of a pair of countries being below either under 1, 2 or 3 SD of the sample). They discover that both the home and host countries' quality of institutions matters, as it increases bilateral trade flows. Institutional homogeneity as well, when defined for a wide enough group (taking either 2 or 3 SD as the cut off value), has an additional explanatory value and significantly and positively affects bilateral trade, but only when looked at broadly (excluding the countries with a SD of over 2 or 3 in the institutional distance).[3] Moreover, the effect of governance homogeneity does not depend on the levels of governance: "Differences in institutional effectiveness affect trade, independently of the impact of governance effectiveness itself" (de Groot et al., 2004).

That being said, it is important to note that the paper has some technical as well as substance shortcomings, which is one of the reasons for our paper. On the technical side, the data used is a cross-section of countries from 1998, which from the

[2] However, the institutional measures used in this paper are highly appropriate for testing the comparative advantage institutional approach through research on sectoral or product trade level.

[3] Interestingly enough, the authors also show, that the effect of economic development (proxied with GDP p.c.) on trade flows disappears, when controlling for institutional quality, which implies that institutions are in fact the factor driving the development, or at the very least, the effect of development on trade flows.

starts limits the econometrics options and has an inherent risk of endogeneity, since dyadic fixed effects and with that – multilateral resistance (see discussion in Section 4) – can not be controlled for. On the substance side, the paper uses WB WGI as their measure of institutions, although these indicators are in fact capturing only governance and should be treated and interpreted as such. When trying to control for the institutional environment, more thought is needed, starting from the theory and arriving at a more complete set of indicators, which can than account for all the dimensions of (at least) formal institutional environment (see more in Section 4).

Finally, it is important to note also the recent discussion on the structural gravity models, derived from general equilibrium theory to explain the distribution of trade flows between countries, where Frish et al. (2023) provide a good overview of. These models consider trade costs, such as tariffs, transportation expenses, and non-tariff barriers, and incorporate multilateral resistance terms, which reflect the relative ease or difficulty of market access for exporters and importers. The recent literature has advanced the estimation techniques of these models, particularly through the use of the Poisson Pseudo-Maximum-Likelihood estimator, which addresses issues of zero trade flows and heteroscedasticity (Santos Silva and Tenreyro, 2006).

A notable development in this field is the introduction of two-stage structural gravity models, where the first stage decomposes trade flows into fixed effects, and the second stage regresses these on observable trade cost measures, including new topographical variables (Anderson and Yotov, 2016). This approach allows researchers to distinguish between historical and contemporaneous trade costs. Key studies such as Anderson and van Wincoop (2003) have laid the groundwork for understanding border effects, while more recent contributions, like Kitamura and Lagerlöf (2020) and Nunn and Puga (2012), have enriched the analysis by incorporating the impact of geographical features like mountains and rivers on trade.

In summary of the existing literature we are basing our approach on, the indicators mostly used in the literature to test the effect of institutional quality on trade are the indices from World Bank World Governance Indicators (Kaufmann et al., 2009), predominantly only the rule of law index, or indices from Political Risk Service from International Country Risk Guide (ICRG, The PRS Group, 2013), where also rule of law index is often used. Never, however, do the studies take into account the underlying new institutional economics theory, control for different institutional environments and rarely include any measure of institutional homogeneity or distance.

2. Theoretical Framework

A model, which provides a direct link between country characteristics, country pair characteristics, and trade flows and which has become the literature's work-horse model for the study of bilateral flows, is the gravity model. It can be theoretically derived from a variety of international trade models, but more interestingly, Head and Mayer (2011a) and Head and Mayer (2011b) show how the gravity relationship can be derived using only two conditions; importer's budget allocation and exporter's market clearing.

The first condition denotes that expenditures of country j X_j are allocated between goods from different countries, Π_{ij} being the share of expenditures in country j being spent on goods from country i, yielding the total value of trade from country i to j as $X_{ij} = \Pi_{ij}X_j$.

The sum of all shares ij over i is one and the sum of all bilateral flows X_{ij} over i is X_j. The crucial step is to show that Π_{ij} can be expressed in the multiplicative form $\Pi_{ij} = \frac{A_i \phi_{ij}}{\Phi_j}$, where A_i are the characteristics of the exporter i, $0 \leq \phi_{ij} \leq 1$ measures the accessibility of the market and can be thought of as the total trade costs, and Φ_j is the degree of competition in the market j.

The exact form of ϕ_{ij} depends on the underlying theoretical model, but the form remains the same. Head and Mayer (2011b) show in their online appendix to Head and Mayer (2011a), that this form is compatible with a wide range of extensively used theoretical models, such as CES national product differentiation models, CES monopolistic competition (Dixit-StiglitzKrugman) models, models with heterogeneous consumers, models with heterogeneous industries (comparative advantage) and the newest set of models with heterogeneous firms (Melitz-Chaney type models). We can then write the first step version of the gravity specification as $X_{ij} = \Pi_{ij} X_j = A_i \frac{X_j}{\Phi_j} \phi_{ij}$.

The second condition, the market clearing for the exporter, tells us that the total value of production for each exporter Q_i has to be the same as the sum of shipments to all destinations, including itself, as $Q_i = \sum X_{ij}$. At the world level, production equals expenditure, so we can write $Q = X$, and thus country j's share in the world expenditure equals the share in the world production $\frac{X_j}{X} = \frac{X_j}{Q}$. Using this identities we can reexpress the market clearing condition, where Φ_i^* is the market potential

or access term, central in economic geography (see more in Head and Mayer (2011a)), as $Q_i = \sum_j \Pi_{ij} X_j = A_j \sum_j \frac{X_j \phi_{ij}}{X \Phi_j} X = A_i \Phi_i^* Q$.

Expenditures Q_i of a country are equal to the country's nominal Gross Domestic Product (GDP) Y_i, so we can express A_i as $A_i = \frac{Y_i}{\Phi_i^* Y}$, and substitute it above, which yields the theoretical gravity equation specification in Equation (1).

$$X_{ij} = \frac{Y_i}{\Phi_i^* Y} \frac{X_j}{\Phi_j} \phi_{ij} = \frac{1}{Y} \frac{Y_i}{\Phi_i^*} \frac{X_j}{\Phi_j} \phi_{ij} \tag{1}$$

Cross section Equation (1) can then be extended to the time dimension and used to arrive at consistent empirical estimates of factors affecting bilateral trade flows. Trade costs ϕ_{ij} are an integral part of trade flows analysis. It is argued that besides distance, trade costs arising from institutional factors such as law enforcement, property rights and informal institutions are even more important than trade policy instruments (Anderson and van Wincoop, 2004). The quality of institutions in both the country of origin as well as the importing country plays a direct role in the frequency and magnitude of the trade costs. Specifically, the share of trade costs which is dependent on institutions will be country specific: "Poor institutions [...] penalize trade differentially across countries" (Anderson and van Wincoop, 2004, p. 693).

We continue on this note saying that it is not only the quality of institutions of both countries that will have a considerable effect on bilateral trade flows, it is also the institutional distance, calculated as institutional quality of origin country *i* minus institutional quality of destination country *j*. This notion rests on a logic similar to the gravity equation for intra-industry trade, where similar countries trade more with one another. It extends this concept of similarity to institutional framework. We argue that the difference in the quality of institutions is an important determinant of trade costs and thus trade flows, as firms will tend to trade with firms from similar institutional environments. This in turn aggregates on a macro level to larger trade flows between countries where institutional distance is small (controlling of course, for other relevant factors). A WTO publication (Beverelli et al., 2012) emphasizes a similar logic of firms searching for trade partners from similar business environments.

The negative effect of institutional distance should thus hold unless there are specific ways to enhance trade outside of the general trade theory, where a large difference in the quality of institutions could spur more trade, perhaps because with a large difference in some of the quality of institutions, breaking the rules can be easier than accruing the differential costs of following them.

3. Empirical Framework and Data

The prevalent model for bilateral trade flows research has for long been the gravity model, and it provides a direct link between trade flows and trade barriers, while incorporating the relevant factors affecting trade flows. One of the first applications of the gravity theory was Anderson (1979), followed by a number of papers, such as McCallum (1995), Rose (2000), and Rose and van Wincoop (2001).

Since Anderson and van Wincoop (2003), it has however, became apparent that the multilateral resistance term $\frac{1}{\Phi_i^* \Phi_j}$ from the theoretical gravity Equation (1) has to be accounted for. Only including respective countries GDP's in estimation, without the market potential and market competition terms, biases the estimates on the trade cost term, as market competition depends on the capabilities of all exporters present in that market and the ease of market access $\Phi_j = \sum i \; A_i \phi_{ij}$. Baldwin and Taglioni (2006) write about the three medals mistakes one can commit in estimating the gravity equation. They name the inclusion of country GDP's in the attempt to correctly capture the market potential and market competition terms as the gold medal mistake.

Equation (1) with the additional time dimension, expressed for a country *i*, can be log linearized and estimated. The time varying term $ln\frac{1}{Y_t}$ is captured with time dummies, while the monadic terms (that vary on the *it* and *jt* dimension) are log of GDP per capita and log of population, which accounts both for size of the country and its level of the development and is available in the World Bank World Development Indicators (The World Bank, 2023). The most interesting term is the bilateral trade openness term ϕ_{ijt} which is proxied with a set of extended control variables from Head et al. (2010), some of which are time invariant dyadic controls, and some are time variant dyadic controls. The first group of controls (which vary on the *ij* dimension) are log of distance, shared border, shared language, colonial history and being a colony, while the second group of controls (which vary on the *ijt* dimension) are regional trade agreement (RTA), both countries being members of General Agreement on Tariffs and Trade, sharing a currency and the preferential treatment of exports from Asia-Caribbean-Pacific preferential trade countries to the EU. The dummy variable on whether two countries used to be part of another common political entity is extracted from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) distance database (Mayer and Zignago, 2011) and extended for the period under analysis.

Bilateral export flows are gathered from the World Integrated Trade Solution (WITS) system from the World Bank. We start with the entire export database based

on Standard International Trade Classification (SITC) rev. 3 nomenclature, which is then supplemented when needed by SITC rev. 2, Harmonized System (HS) HS2007, HS2002, HS1996, HS1988/92, respectively. Finally, since exports are the flip side of imports, the resulting flows are supplemented by reversed import flows based on SITC rev. 3 and SITC rev. 2, multiplied by 0.9 to account for the difference between the export (fob) and import (cif) values (which also includes trade costs).

Several institutional proxies are available for empirical analysis, but few, with the exception of projects such the Institutional climate index from Eicher and Röhn (2007) make an effort towards a systematic approach to the entire institutional environment. Thus, the institutional quality variables we use in this paper come from The Institutional Quality Dataset of Kuncic (2014), who calculates the relative quality of formal institutional environment for all countries in the world in the period 1990 – 2010. This dataset is the most suitable due to earlier time and worldwide country coverage, as well as due to the procedures used to arrive at institutional measures. Now we can also say that it has passed the test of time, with ample citations in academic journals of both the published paper as well as previous working version (Kuncic, 2012), so it becomes our preferred institutional measure for those factors, which is also why the studies sample covers the 1990 – 2010 period.

The Institutional Quality Dataset (Kuncic, 2014) derives institutional measures from the theory and using more than thirty existing institutional indices, the underlying quality of legal, political and economic institutions is calculated for each country in every year, relative to all the others. These three institutional monadic variables that vary on the *it* and *jt* dimension are additionally used in calculating institutional distance terms, by subtracting the destination's quality of each institutional environment to the origin's one and taking the absolute value of the result. Measures of institutional distance thus vary on the *ijt* dimension. Institutional distance calculated on the basis of the afore mentioned indicators captures the relative distances between countries very well, as the indicators themselves are calculated on a relative basis.

Consistent estimates of the gravity equation involve controlling for exporter-time fixed effects and for importer-time fixed effects, which besides monadic terms also captures the multilateral resistance term $\frac{1}{\Phi_i^* \Phi_j}$ and thus is not biasing the estimates of ϕ_{ijt}. However, controlling for monadic-time fixed effects firstly presents itself as a technical problem, as the econometric software can not process such a large number of dummies; with 50 years of data and 200 countries, this would imply 20000 dummies would have to be estimated. The literature resolves the problem of multilateral resistance in several ways. The first one is by controlling for what it can, which implies, besides the usual explanatory variables, controlling

also for time, exporter, importer and dyadic fixed effects. The rationale is that by including all the fixed effects possible, depending of course on specific research focus at hand, the results of the gravity specification should be fairly robust. Another way of controlling for the multilateral resistance is by exploiting the multiplicative form of the gravity equation, as the problematic monadic terms can be canceled out by taking ratios of flows, as for instance the friction specification used by Head and Ries (2001), or, taking the ratio of ratios, called the tetrads specification in Head et al. (2010). The latter one cancels out everything exporter-time and importer-time specific and allows for consistent estimates of the effect of trade costs and barriers that vary on the *ijt* dimension, although the explanatory power of this approach is incredibly low. An additional problem with controlling for the importer-timer and exporter-time fixed effects is, that the monadic variables can not be identified anymore. This implies that also the effect of the quality of institutional environment can not be identified in the tetrads specifications, as it varies only on the *it* and *jt* dimension. However, the dyadic time varying variables, which vary on the *ijt* dimension, can still be identified, which also includes institutional distance. Additionally, the tetrads specification in fact leaves very little variation to be looked at, and has to due to this obsessive cleansing property, be taken with a large grain of salt.

Institutions are inherently endogenous, and are known to be correlated with development, which requires an additional solution besides controlling for multilateral resistance. The use of instruments which do not vary in time, such as Acemoglu et al. (2001)'s settler mortality or geographical instruments, is prevented by the panel structure of the data. Thus, we use the approach of Benassy-Quere et al. (2007) to purge our institutional variables of their endogenous nature. Firstly, we start by regressing GDP per capita on each institution and then collect the residual, which is orthogonal to the so called 'capture all' development variable GDP per capita, and proceed with the residual as the orthogonalized institutional measure. Secondly, we also instrument for the already orthogonalized institutional quality measures with their first lags, avoiding the possibilities of contemporaneous connections between residuals and institutions.

We show the structure of the data and the dangers of not controlling for fixed effects properly or not cleansing the institutional variables of their endogeneity with a progression of regressions. We start with the most common, sometimes also called naive gravity equation, and then proceed to include and control for an increasing number of fixed effects, controlling for multilateral resistance, we also show the results of the tetrads specification, where exporter-time fixed effects and importer-time fixed effects are completely controlled for. Finally, we use the orthogonal values of institutional variables and also instrument them in our preferred

regression. Next, we are particularly interested in the effect of institutional distance on trade flows, allowing also for alternative specifications of institutional distance and interactions. The world trade data, which includes trade flows between all countries in the world, comes from WB WITS, standard trade control from Head et al. (2010), Mayer and Zignago (2011) and de Sousa (2012). Finally, the institutional data, which includes data on relative quality of legal, political and economic institutions for all countries in the world in the period 1990 – 2010 and also our sample of study, comes from Kuncic (2014). A thorough descriptions of all datasets can be found in the respective papers.

T a b l e 2

Summary Statistics

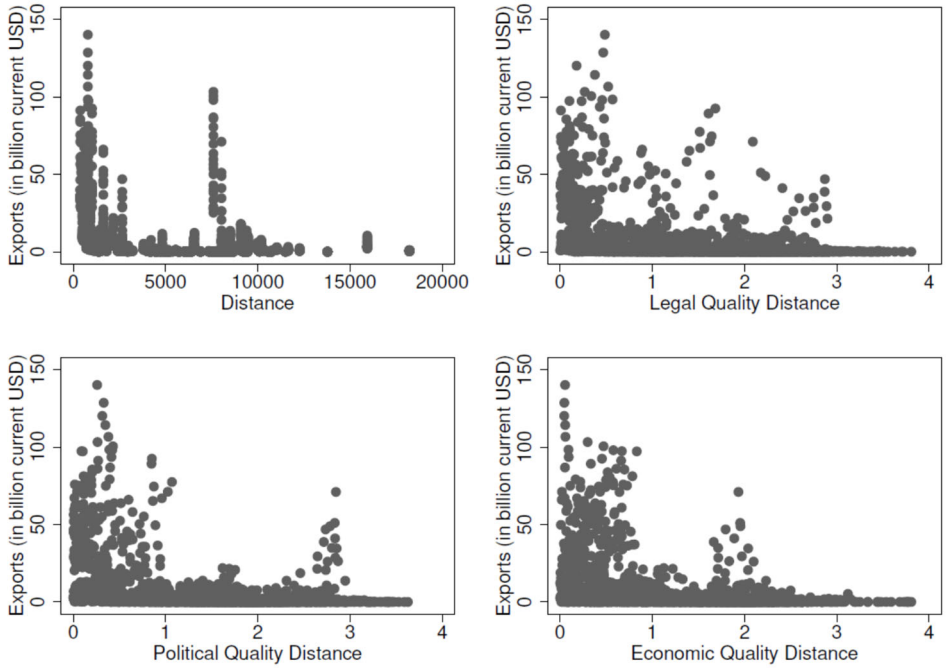
Variable	mean	sd	min	max
export (mill current USD)	683.4	5195.97	0	332846.66
pop o	58.18	171.37	0.49	1337.83
pop d	57.55	170.42	0.49	1337.83
gdpcap o	10385.23	13732.12	86.03	95189.87
gdpcap d	10359.72	13728.14	86.03	95189.87
distance	7623.64	4443.40	114.64	19650.13
common border	0.03	0.16	0	1
common country	0.01	0.10	0	1
common language	0.13	0.34	0	1
common legal	0.32	0.47	0	1
colony	0.02	0.14	0	1
rta	0.12	0.33	0	1
wto	0.82	0.38	0	1
common currency	0.01	0.11	0	1
acp to eu	0.04	0.20	0	1
legal inst o	0.06	0.93	–2.15	1.93
political inst o	0.25	0.93	–2.13	2.04
economic inst o	0.03	0.93	–2.93	1.89
legal inst d	0.05	0.93	–2.15	1.93
political inst d	0.24	0.93	–2.13	2.04
economic inst d	0.02	0.93	–2.93	1.89
abs(legal diff)	1.08	0.78	0	3.98
abs(political diff)	1.09	0.77	0	3.82
abs(economic diff)	1.08	0.77	0	4.71

Note: Export refers to the value of exports in millions of current USD. Pop o and Pop d denote the population of the origin and destination countries, respectively, in millions. Gdpcap o and Gdpcap d represent the GDP per capita of the origin and destination countries, respectively, in USD. Distance indicates the geographical distance between the two countries in kilometers. Common border is a dummy variable indicating if the countries share a border, while Common country indicates if the countries were once part of the same political entity. Common language is a dummy variable indicating if the countries share a common language, and Common legal indicates if the countries share the same legal origin. Colony denotes if one country was a colony of the other. RTA stands for Regional Trade Agreement, and WTO refers to World Trade Organization membership. Common currency indicates if the countries share the same currency, and African, Caribbean, and Pacific (ACP) to EU refers to the preferential treatment of exports from African, Caribbean, and Pacific countries to the European Union. Legal inst o, Political inst o, and Economic inst o represent the quality of legal, political, and economic institutions in the origin country, respectively, while Legal inst d, Political inst d, and Economic inst d represent the same for the destination country. Abs(legal diff), Abs(political diff), and Abs(economic diff) denote the absolute value of the differences in legal, political, and economic institutional quality between the origin and destination countries, respectively.

Source: World Bank WITS; Head et al. (2010); Mayer and Zignago (2011); de Sousa (2012); Kuncic (2014); own calculation.

Table 2 show the summary statistics of the variables used in estimation, where the value of exports and GDP's is expressed in millions current USD, and population is expressed in millions as well. With the dummy variables, the mean values show the share of country pair observations in the entire pooled sample, that share that particular common characteristics. For instance, 13% of country pairs in the sample share a language, 12% have a regional trade agreement in place and 82% are simultaneously members of the WTO. Moreover, our focus on institutional distance and the assumptions, drawing parallels between geographical and institutional distance, are substantiated in Figure 1.

F i g u r e 1
The Importance of Distance: Germany's Trade



Source: Own calculation.

Exports against geographical weighted distance, legal institutional quality distance, political institutional quality distance and economic institutional quality distance are plotted for Germany for the pooled period 1990 to 2010. The summary evidence shows expectedly, that geographical distance impedes trade, but also confirms our starting assumption, that we are on the right track with comparing the effects of institutional distances on bilateral trade flows to the effect of geographical distance. The scatter plots showing the relations between trade flows and four different concepts of distance display non-linearities, but are also very similar

implying that the analogy between the effects of geographical and institutional distances on trade flows. However, whether this hold in the entire sample and for all the countries is examined in detail in the next section.

4. Empirical Estimations and Discussion

In this section, we show the progression of gravity estimations, starting with a simple gravity specification plagued by several endogeneity problems, and proceeding by improving the specification in order to eliminate as many sources of bias as possible, while still managing to identify our variables of interest. We continue with our focus on institutional distance, by checking the robustness of our results with an alternative specification of institutional distance. As a final robustness check, we also show the relation of our preferred institutional measures to other indices widely used in the literature.

We take Equation (1) to the data with several ways of controlling for fixed effects (FE), which is shown in baseline gravity results in Table 3, and points to several empirical findings. Most importantly, it shows that a gravity specification which does not control for exporter, importer and dyadic fixed effects is plagued by too many biases to be worth interpreting. The partial coefficients settle down on their sign as well as significance and magnitude (predominantly) only after the inclusion of dyadic fixed effects, both in terms of standard gravity variables as well as in terms of institutional qualities and institutional distance. It seems that overall, dyadic specific and time invariant factors correct the biggest biases, as before they are controlled for (and those results are available upon requests), artifacts such as a negative effect of origin's population or a negative effect of sharing a currency falsely arise, and the institutional estimations vary in the same manner as well.

Regression 1 in Table 3, which includes time, exporter, importer and dyadic fixed effects replicates the standard literature results of gravity estimation, yielding a positive size and development effect for both origin and destination country population sizes and levels of development. Sharing a regional trade agreement, WTO membership or currency also affects bilateral trade positively, while the country pairs with the exporter from the ACP region have a significantly lower bilateral trade (hence the preferential trade treatment). The tetrad regression in column 2 controls for complete multilateral resistance, as it controls for exporter-time and importer-time fixed effects, time fixed effects and dyadic fixed effects, thus, it can only identify variables varying on the *ijt* dimension, where it reproduces results from Regression 1 with some loss of significance.

T a b l e 3

Full Gravity Estimations

Dep. var: ln(exports)	1	2	3	4	5
ln(pop o)	0.174*		0.152	0.215***	0.367***
	–0.101		–0.102	–0.0584	–0.0564
ln(pop d)	1.417***		1.352***	1.270***	1.376***
	–0.0936		–0.0941	–0.0581	–0.0561
ln(gdpcap o)	0.545***		0.544***	0.502***	0.486***
	–0.0309		–0.031	–0.0188	–0.0178
ln(gdpcap d)	0.630***		0.644***	0.651***	0.675***
	–0.0302		–0.0295	–0.0188	–0.0178
legal inst o	0.146***		0.169***	0.208***	
	–0.0244		–0.0243	–0.0202	
political inst o	–0.0735**		–0.0500*	–0.0364*	
	–0.0295		–0.0259	–0.02	
economic inst o	–0.0743***		–0.0464**	–0.0494***	
	–0.0212		–0.0206	–0.0153	
legal inst d	–0.00202		0.0263	0.0187	
	–0.0256		–0.025	–0.0203	
political inst d	0.0917***		0.0944***	0.0975***	
	–0.0288		–0.0252	–0.02	
economic inst d	0.0268		0.0510**	0.0579***	
	–0.0226		–0.0213	–0.0153	
abs(legal diff)	–0.0219	0.00313	0.0105	0.0095	–0.0201
	–0.0194	–0.0248	–0.0188	–0.0184	–0.018
abs(political diff)	0.0682***	0.105***	0.0685***	0.0899***	0.0710***
	–0.0228	–0.0306	–0.0192	–0.0174	–0.017
abs(economic diff)	–0.106***	–0.182***	–0.0716***	–0.0940***	–0.111***
	–0.0169	–0.0224	–0.0164	–0.0128	–0.0127
Constant	1.433***	9.87E-09	1.629***	1.971***	1.108***
	–0.527	–0.0133	–0.583	–0.364	–0.354
Observations	184,622	176,425	184,622	168,901	168,901
R-squared	0.882	0.022	0.882	/	/
Time FE	YES	YES	YES	YES	YES
Exporter FE	YES	YES	YES	YES	YES
Importer FE	YES	YES	YES	YES	YES
Dyadic FE	YES	YES	YES	YES	YES
Orthog. Inst.	NO	NO	YES	YES	YES
Instrumented Inst.	NO	NO	NO	YES	YES

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1. Country pair robust standard errors in parentheses. When dyadic fixed effects are included, exporter and importer fixed effects are controled for by construction. Rows with the dyadic-time invariant controls (ln(distance), common border, common country, common language, common legal, colony) are excluded as they are controlled for by the FE and thus do not have identifiable partial coefficients, while dyadic-time variant controls (rta, wto, common currency, acp to eu) are excluded purely in the interest of space and the results are available upon request. With the tetrads in regression 2, standard errors are Clustered Generalized Method of Moments (CGM) standard errors, the FE are in fact Exporter-time and Importer-time, and the reference importer and exporter are France and Great Britain. In regressions 4 and 5, the Kleibergen-Paap rk LM statistic at $P = 0.000$ imply that the matrix is full column rank - that the model is identified, and instruments are relevant. Since we have exactly as many instruments as we have endogenous regressors, we can not test for exogeneity.

Apart from variables already explained in the preceding table, Ln(pop o) and Ln(pop d) refer to the natural logarithm of the population of the origin and destination countries, respectively. Ln(gdpcap o) and Ln(gdpcap d) denote the natural logarithm of the GDP per capita of the origin and destination countries, respectively. The variables Legal inst o, Political inst o, Economic inst o, Legal inst d, Political inst d, Economic inst d, Abs(legal diff), Abs(political diff), and Abs(economic diff) have the same meanings as noted in Table 2.

Source: Own calculation.

Turning to the institutional variables of interest which are well identified in regressions 1 and 2, but to yet cleansed of their endogenous nature. Orthogonalizing institutional quality measures yields regression 3, and going even further, instrumenting them by their first lags, yields regression 4, which is in signs, magnitude and significance similar to 3, but also 1 and 2, implying that the most important bias source we controlled for has a dyadic and time specific character, and while institutions can also be orthogonalized, instrumentation does not seem to be crucial. Nevertheless, to err on the side of caution, including all controls, fixed effects and using the orthogonal institutional measures, our preferred regression is in column 5, controlling for as much as possible in terms of multilateral resistance and making special adjustments for the endogenous nature of institutional quality.

The results imply that what affects trade positively, are origin's legal, and destination's political and economic institutions. Origin's political and economic institutions affect bilateral trade negatively. It seems we have a push factor in the form of good legal environment on the exporter's side, and two pull factors in the form of good political and economic institutions on the importer's side. Interestingly enough, good economic and political institutions on the exporter's side seem to discourage trade, which implies that good political and economic rules offer a good position to be active in the domestic market. Destination's quality of legal institutions is not significant. In terms of subject category, the quality of political and economic institutions is dominant, as both partner's institutions matter. But in terms of magnitude, the most salient institutional factor is the quality of legal institutions in the origin country, as its increase for one standard deviation implies an increase of exports from that country for more than 20%.

We are most interested in the institutional distance triplets, and are surprised to find that legal institutional distance does not seem to have an effect on bilateral trade. The effects of political institutional distance and economic institutional distance are consistently estimated across specification, having a positive and negative effect, respectively. A positive effect of political institutional distance on bilateral trade implies that countries that are further apart in their qualities of political systems, trade more on the margin. The reasons for that can lie in the uncomfortable possibility that trade can also be spurred by corrupted politicians or unaccountable country leaders, who can facilitate trade outside of general trade enhancing rules, but more research is necessary to pursue this explanation, especially in the field of how multinationals with large trade flows conduct business. The negative effect of economic institutional distance is expected, as a large difference in economic rules of how the economy/business works at home in comparison to the destination country represents an additional adjustment cost for the firms (have to learn how the other side does business). The negative effect of economic institutional distance

implies also a trade diversion effect. For an exporter, an increase in the quality of its economic institutional environment leads to a shift of exports from the countries economically further away from the exporter to the countries economically closer to the exporter. An increase in economic institutional distance reduces trade by around 10%. Similar countries, in terms of economic institutions, trade more.

Finally, the regression in column 5 shows that when multilateral resistance is controlled for with time, exporter, importer and dyadic fixed effects, and institutions cleansed of their endogenous dimension, the effects of institutional distance can be consistently estimated even without the inclusion of institutional quality on the exporter's and importer's side.

We test the effect of institutional distance by yet another way, following de Groot et al. (2004), which serves as a robustness check for our previous results and also allows a direct comparison to the results of de Groot et al. (2004). In Table 4, institutional distance is redefined with dummy variables. Instead of using the orthogonalized institutional quality measure from Kuncic (2014), we define institutional quality dummies on legal, economic and political institutional differences as being one, if the orthogonal institutional distance is less than „x = one" standard deviation (narrow homogeneity) – regressions 1 and 2, or "x = three" standard deviations of the sample (broad homogeneity) – regressions 2 and 3, in each year.

T a b l e 4

Institutional Homogeneity

	< 1 std. dev.	**< 1 std. dev.**	**< 3 std. dev.**	**< 3 std. dev.**
Dep. var: ln(exports)	**1**	**2**	**3**	**4**
legal inst o	0.169***		0.168***	
political inst o	–0.0545**		–0.0586**	
economic inst o	–0.0436**		–0.0468**	
legal inst d	0.0273		0.0264	
political inst d	0.0884***		0.0849***	
economic inst d	0.0547**		0.0510**	
abs(legal diff) < xSD	–0.00268	0.00971	–0.0275	0.00263
abs(political diff) < xSD	–0.0312**	–0.0210*	–0.0642**	–0.0441*
abs(economic diff) < xSD	0.00704	0.0133	0.142***	0.162***
Observations	184,622	184,622	184,622	184,622
R-squared	0.882	0.882	0.882	0.882

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1. Country pair robust standard errors in parentheses. Control variables rows and standard error rows are not shown but available upon requests. All specifications include Time, Exporter, Importer and Dyadic FE, as well as Orthogonal institutions.
Apart from variables already explained in the preceding tables, Legal inst o, Political inst o, and Economic inst o represent the quality of legal, political, and economic institutions in the origin country, respectively, while Legal inst d, Political inst d, and Economic inst d represent the same for the destination country. Abs(legal diff) < xSD is a dummy variable indicating if the absolute value of the difference in legal institutional quality between the origin and destination countries is less than x standard deviations. Similarly, Abs(political diff) < xSD and Abs(economic diff) < xSD indicate if the absolute value of the differences in political and economic institutional quality between the origin and destination countries is less than x standard deviations, respectively.

Source: Own calculation.

In Table 4, we confirm our results from Table 3, both in terms of the effects of institutional quality levels as well as in terms of the effects of institutional similarity/homogeneity (which corresponds to a reversed side of institutional distance) in political and economic institutions. The effect of negative political institutional homogeneity can be detected at both the chosen cut-offs, whereas the positive effect of economic institutional homogeneity can be detected at the broader definition of institutional homogeneity. The other gravity variables, as well as institutional levels variables keep their signs, magnitude and significance as before. Also, the results on the institutional distance are again not dependent on the inclusion of institutional quality levels.

Conclusion

The aim of this paper is to thoroughly examine the effect of institutions on bilateral trade flows within a gravity model. Theoretically, we derive the gravity set up from the two accounting conditions on the exporter and importer side, and make the case for the inclusion of institutions in the trade costs term. We operationalize the theoretical gravity specification controlling specifically for multilateral resistance.

As opposed to much of the literature, we do not rely on one or another specific institutional index, but use a set of theory-based measures on formal institutional environment from Kuncic (2014), who calculates measures of institutional quality of legal, political and economic environment, and correct them for their inherent endogenous nature. Besides examining institutional levels, we concentrate on getting unbiased estimates of institutional distance on trade, which is rarely done in the literature.

Our gravity specification includes standard monadic gravity variables to capture the size and development of each country, as well as dyadic variables such as distance, common border, trade agreements, common currency etc. We add institutional quality levels and institutional distance to the gravity equation, and show that it is crucial to control for multilateral resistance with as many fixed effects as possible, and also important to purge the institutional variables of their endogenous nature. Our final specifications include time, exporter, importer and dyadic fixed effects to control for multilateral resistance, as well as orthogonalized institutional levels and distances. We show and confirm our findings also with the so-called tetrads approach.

The results show that institutions are in fact important determinants of bilateral trade, but not as uniformly as expected. Both origin's as well as destination's institutions matter. They imply that there is a push factor in the form of good legal

environment on the exporter's side, and two pull factors in the form of good political and economic institutions on the importer's side. The marginal effect of economic and political institutions on the exporter's side is negative, that is trade reducing, which points to the fact that in a stable political and good economic environment, domestic market becomes relatively more attractive. The most salient institutional factor is the quality of legal institutions in the origin country.

The focus of the gravity estimations is on legal, political and economic institutional distance. Surprisingly, legal institutional distance does not have an effect on bilateral trade on the margin, while political and economic institutional distance have a positive and negative marginal effect, respectively, consistently estimated across specifications. The positive effect of political institutional distance is explained with firms arranging business in less than legitimate ways with the help of politics on one or the other side, while the negative effect of economic distance lies in the increase of costs due to operating in and adjusting to a different business environment. These results are confirmed by using an alternative measure of institutional distance.

In comparison with the literature, our findings show that the institutional quality of both the origin and destination countries significantly influences bilateral trade flows. This aligns with the work of de Groot et al. (2004), who found that institutional homogeneity positively impacts trade flows. However, our study goes further by disaggregating institutional quality into legal, political, and economic dimensions and by explicitly focusing on institutional distance. Unlike Anderson and Marcouiller (2002), who emphasized the role of corruption and rule of law, we demonstrate that economic institutional distance has a notably negative effect on trade, while political institutional distance has a positive effect. This finding contrasts with Levchenko (2007), who identified legal institutional differences as significant for bilateral trade flows but did not account for the multidimensional nature of institutional quality. By incorporating the theoretical advancements and empirical techniques of structural gravity models, such as those outlined by Anderson and van Wincoop (2003), our study provides a more nuanced understanding of how various institutional factors and their distances affect trade costs and flows.

While this paper provides significant insights into the impact of institutional quality and distance on bilateral trade flows, it is not without limitations. Firstly, the study covers a specific period from 1990 to 2010, and the findings may not fully capture more recent institutional changes or trade dynamics. Future research could extend this analysis to more recent data to examine whether the observed patterns hold in the current global trade environment. Secondly, while we use a comprehensive set of institutional measures, there may be other relevant institutional aspects,

such as informal institutions and cultural factors, that were not included in our analysis. Further research could explore these dimensions and their interplay with formal institutions. Additionally, our findings on the positive effect of political institutional distance suggest potential areas for deeper investigation into how political arrangements and corruption might influence trade practices. Finally, the methodological approach, while robust, can always benefit from the application of ever improving and newer econometric techniques and models that address zero trade flows and heteroscedasticity in new and innovative ways. Exploring these avenues could provide a more holistic understanding of the complex relationship between institutions and trade.

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