

Trade and institutions: do not forget institutional distance*

Aljaž Kunčič †

2013

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 new institutional dataset), institutional endogeneity (cleansing the endogenous part) and state of the art gravity trade estimations (controlling for multilateral resistance). 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, which is generally overlooked in the literature. We derive a theoretical gravity equation and test it empirically. 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 in through trade costs, while political institutional distance increases trade, pointing to alternative ways of trade enhancement. We confirm these results with an alternative specification and show also their heterogeneity, whereas both institutional distance effects dissipate for country pairs sharing a regional trade agreement.

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

JEL classifications: F14, B52

*This research was supported by a grant from the CERGE-EI Foundation under a program of the Global Development Network. All opinions expressed are those of the author(s) and have not been endorsed by CERGE-EI or the GDN.

†Aljaž Kunčič (aljaz.kuncic@fdv.uni-lj.si) is a researcher at the University of Ljubljana, Faculty of Social Sciences, Kardeljeva ploscad 5, 1000 Ljubljana, Slovenia.

1 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 new dataset on institutions, 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 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 2 of this paper presents the literature in the field of trade and institutions. Section 3 sets up the theoretical framework, and Section 4 proposes an empirical specification and identification of the research question at hand. Section 5 presents and discusses the empirical results, and Section

6 concludes and summarizes the findings.

2 Literature review on trade and institutions

Institutions that guide and affect trade are not only international organizations with their rules of conduct and membership such as the WTO, which is a big force in the formation of the global trade landscape (Jackson, 2002; Andlung et al., 2013). According to New Institutional Economics, they are most and foremost the rules of the game (North, 1990, 1993), which have an effect on market and social interactions, and 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.

Table 1: Literature on trade and institutions

Authors	Journal	Main inst. proxy	Conclusions	Inst. dist.
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 trade share and institutions should be examined as complements.	no
Trade and institutions (focus on contract imperfectiveness)				
Cowan and Neut (2007)	Working Papers Central Bank of Chile	ICRG Political risk	Countries with more complex intermediate goods structures and poor institutional environment suffer a relatively higher loss of productivity.	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

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. Another way of looking at the two ways of including institutions into trade analysis is that mainly, 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.¹

The work by de Groot et al. (2004) is particularly salient for this paper, as it is one of the few 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 WB WGI (Kaufmann et al., 2002). They test both 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 only the countries with a SD of over 2 or 3 in the institutional distance).² 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 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

¹However, 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.

²Interestingly 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.

set of indicators, which can than account for all the dimensions of (at least) formal institutional environment (see more in Section 4).

In summary of the existing literature, 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 ICRG (The PRS Group, 2013), where also rule of law index is often used. Never to our knowledge, 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.

3 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 workhorse 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 in Equation 1.

$$X_{ij} = \Pi_{ij} X_j \tag{1}$$

The sum of all shares Π_{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-Stiglitz-Krugman) 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 in Equation 2.

$$X_{ij} = \Pi_{ij} X_j = A_i \frac{X_j}{\Phi_j} \phi_{ij} \tag{2}$$

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 follows from Equation 3.

$$Q_i = \sum_j X_{ij} \tag{3}$$

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 as in Equation 4, where Φ_i^* is the market potential or access term, central in economic geography (see more in Head and Mayer (2011a)).

$$Q_i = \sum_j \Pi_{ij} X_j = A_j \sum_j \frac{X_j \phi_{ij}}{X \Phi_j} X = A_i \Phi_i^* Q \quad (4)$$

Expenditures Q_i of a country are equal to the country's nominal GDP Y_i , so we can express A_i as in Equation 5, and substitute it in Equation 2, which yields the theoretical gravity equation specification in Equation 6.

$$A_i = \frac{Y_i}{\Phi_i^* Y} \quad (5)$$

$$X_{ij} = \frac{Y_i}{\Phi_i^* Y} \frac{X_j}{\Phi_j} \phi_{ij} = \frac{1}{Y} \frac{Y_i}{\Phi_i^*} \frac{X_j}{\Phi_j} \phi_{ij} \quad (6)$$

Cross section Equation 6 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 broad definition of trade costs can be found in the widely cited paper by Anderson and van Wincoop (2004):

Trade costs, broadly defined, include all costs incurred in getting a good to a final user other than the marginal cost of producing the good itself: transportation costs (both freight costs and time costs), policy barriers (tariffs and nontariff barriers), information costs, contract enforcement costs, costs associated with the use of different currencies, legal and regulatory costs, and local distribution costs (wholesale and retail).

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 above 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 recent WTO publication (Beverelli et al., 2012) emphasizes a similar logic:

Search costs are probably lower for trade between countries whose business practices, competitiveness and delivery reliability are well known to one another. Firms in adjacent

countries, countries with a common language or other relevant cultural features are likely to know more about each other and to understand each other’s business practices better than firms operating in less-similar environments. For this reason, firms are more likely to search for suppliers or customers in countries where the business environment is familiar to them. (Beverelli et al., 2012, p. 106)

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.

An important discrepancy exists, when we talk about institutions, between institutional measures that can be used to provide ordinal rankings of countries, and institutional measures that are used more for classification purposes. With the latter institutional measures, the focus is more on the entire institutional framework a combination of institutions is forming. These measures are close to the Varieties of Capitalism (VOC) approach, originated by Hall and Soskice (2001). ”The key notion here is institutional complementary: put simply, institutions across different areas must be consistent with one another in order to support economic development. There is no *a priori* assumption that market or strategic coordination is intrinsically better.” (Kunčič and Šušteršič, 2012, p. 241). In this paper, however, we continue with institutions that allow clear ordinal rankings of countries, and are not interested in particular systemic variety of capitalism a set of institutions might support, but rather in their quality in itself and how this quality compares between countries and affects trade flows.

The studies mentioned in the literature review have established that institutional factors do indeed have an effect on trade, however, they are somewhat arbitrary in choosing which institutions to include. The question this paper deals with is the robust estimates of the effect of institutional quality as well as concentrating on the effect of institutional distance on trade.

4 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, more recently papers such as McCallum (1995), Rose (2000), and Rose and van Wincoop (2001).

Since Anderson and van Wincoop (2003), it has however, become apparent that the multilateral resistance term $\frac{1}{\Phi_i^* \Phi_j}$ from theoretical gravity Equation 6 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 6 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, 2013). 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 Aasia-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 CEPII distance database (Mayer and Zignago, 2011) and extended to 2010.

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 SITC rev. 3 nomenclature, which is then supplemented when needed by SITC rev. 2, 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 Kunčič (2013), based on Kunčič (2012), 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 time and worldwide country coverage, as well as due to the procedures used to arrive at institutional measures. The paper 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 afore mentioned indicators captures the relative distances between countries very well, as it 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 $\frac{1}{\Phi_{it}^* \Phi_{jt}}$ 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 two ways. The first 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. The second 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, comes from Kunčič (2013). A thorough descriptions of all datasets can be found in the respective papers.

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 shows the share of country pair observations in the entire pooled sample, that share that particular common characteristics. For instance, 13% of coun-

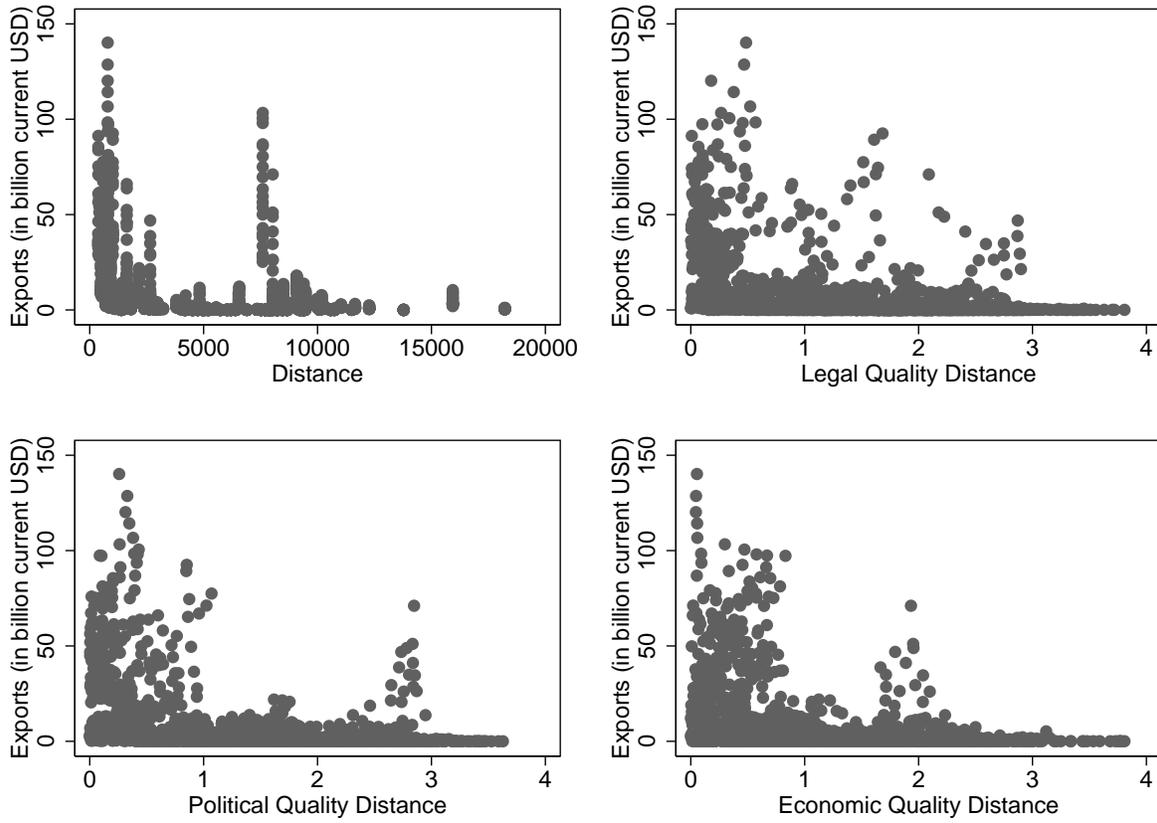
try pairs in the sample share a language, 12% have a regional trade agreement in place and 82% are simultaneously members of the WTO. Moreover, our focus on institutional distance and the assumptions, drawing parallels between geographical and institutional distance, are substantiated in Figure 1. Exports 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.

Table 2: Summary Statistics

variable	mean	sd	min	max
export (mill current USD)	683.40	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	0.00	1.00
common_country	0.01	0.10	0.00	1.00
common_language	0.13	0.34	0.00	1.00
common_legal	0.32	0.47	0.00	1.00
colony	0.02	0.14	0.00	1.00
rta	0.12	0.33	0.00	1.00
wto	0.82	0.38	0.00	1.00
common_currency	0.01	0.11	0.00	1.00
acp_to_eu	0.04	0.20	0.00	1.00
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	0.00	3.98
abs(political.diff)	1.09	0.77	0.00	3.82
abs(economic.diff)	1.08	0.77	0.00	4.71

Source: World Bank WITS; Head et al. (2010); Mayer and Zignago (2011); de Sousa (2012); Kunčič (2013); own calculation.

Figure 1: The importance of distance: Germany's trade



Source: own calculation

5 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 6 to the data with several ways of controlling for fixed effects, 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 distort results most, as before they are controlled for, in regressions 1 and 2, 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 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. 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 4 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 previous results with some loss of significance.

Turning to the institutional variables of interest, they are reasonably well identified in regressions 3 and 4, but do not deal yet with their endogenous nature. Orthogonalizing institutional quality measures yields regression 5, going even further, instrumenting them by their first lags, yields regression 6, which is in signs, magnitude and significance similar to 5, but also 3 and 4, implying that the most important bias source is dyadic and time specific, while institutions should also be orthogonalized, whereas instrumentation does not seem to be crucial. Nevertheless, to err on the side of caution, our preferred regression is in column 6, 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 the game at home and in the destination country represents an additional adjustment cost for the firms. 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 7 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.

Table 3: Full gravity estimations

dep. var: ln(exports)	1	2	3	4	5	6	7
ln(pop_o)	1.278*** (0.0102)	-0.258** (0.101)	0.174* (0.101)		0.152 (0.102)	0.215*** (0.0584)	0.367*** (0.0564)
ln(pop_d)	1.017*** (0.00991)	1.171*** (0.0970)	1.417*** (0.0936)		1.352*** (0.0941)	1.270*** (0.0581)	1.376*** (0.0561)
ln(gdpcap_o)	1.069*** (0.0182)	0.566*** (0.0311)	0.545*** (0.0309)		0.544*** (0.0310)	0.502*** (0.0188)	0.486*** (0.0178)
ln(gdpcap_d)	0.897*** (0.0165)	0.592*** (0.0315)	0.630*** (0.0302)		0.644*** (0.0295)	0.651*** (0.0188)	0.675*** (0.0178)
ln(distance)	-1.162*** (0.0232)	-1.462*** (0.0246)					
common_border	0.738*** (0.114)	0.391*** (0.117)					
common_country	0.954*** (0.162)	0.759*** (0.161)					
common_language	0.634*** (0.0517)	0.661*** (0.0487)					
common_legal	0.280*** (0.0364)	0.277*** (0.0312)					
colony	0.396*** (0.0956)	0.626*** (0.0917)					
rta	0.432*** (0.0456)	0.350*** (0.0412)	0.250*** (0.0257)	0.206*** (0.0386)	0.257*** (0.0256)	0.235*** (0.0206)	0.247*** (0.0205)
wto	0.125*** (0.0347)	0.219*** (0.0322)	0.148*** (0.0297)	0.0211 (0.143)	0.144*** (0.0297)	0.178*** (0.0188)	0.174*** (0.0186)
common_currency	0.0572 (0.117)	-0.244** (0.119)	0.0741* (0.0380)	0.0214 (0.0519)	0.129*** (0.0376)	0.135** (0.0560)	0.0912 (0.0558)
acp_to_eu	0.0444 (0.0907)	0.595*** (0.0766)	-0.761*** (0.109)	-0.679*** (0.140)	-0.776*** (0.109)	-0.778*** (0.0499)	-0.772*** (0.0498)
legal_inst_o	0.346*** (0.0345)	0.142*** (0.0247)	0.146*** (0.0244)		0.169*** (0.0243)	0.208*** (0.0202)	
political_inst_o	0.0281 (0.0368)	-0.0293 (0.0294)	-0.0735** (0.0295)		-0.0500* (0.0259)	-0.0364* (0.0200)	
economic_inst_o	0.0677** (0.0285)	-0.0659*** (0.0215)	-0.0743*** (0.0212)		-0.0464** (0.0206)	-0.0494*** (0.0153)	
legal_inst_d	0.117*** (0.0354)	-0.000165 (0.0262)	-0.00202 (0.0256)		0.0263 (0.0250)	0.0187 (0.0203)	
political_inst_d	-0.188*** (0.0350)	0.126*** (0.0290)	0.0917*** (0.0288)		0.0944*** (0.0252)	0.0975*** (0.0200)	
economic_inst_d	0.284*** (0.0281)	0.00898 (0.0226)	0.0268 (0.0226)		0.0510** (0.0213)	0.0579*** (0.0153)	
abs(legal_diff)	0.0673** (0.0275)	0.0749*** (0.0223)	-0.0219 (0.0194)	0.00313 (0.0248)	0.0105 (0.0188)	0.00950 (0.0184)	-0.0201 (0.0180)
abs(political_diff)	-0.0801*** (0.0286)	0.0821*** (0.0227)	0.0682*** (0.0228)	0.105*** (0.0306)	0.0685*** (0.0192)	0.0899*** (0.0174)	0.0710*** (0.0170)
abs(economic_diff)	0.0790*** (0.0221)	-0.114*** (0.0180)	-0.106*** (0.0169)	-0.182*** (0.0224)	-0.0716*** (0.0164)	-0.0940*** (0.0128)	-0.111*** (0.0127)
Constant	3.270*** (0.290)	11.79*** (0.810)	1.433*** (0.527)	9.87e-09 (0.0133)	1.629*** (0.583)	1.971*** (0.364)	1.108*** (0.354)
Observations	184,622	184,622	184,622	176,425	184,622	168,901	168,901
R-squared	0.706	0.776	0.882	0.022	0.882	/	/
Time FE	YES	YES	YES	YES	YES	YES	YES
Exporter FE	NO	YES	YES	YES	YES	YES	YES
Importer FE	NO	YES	YES	YES	YES	YES	YES
Dyadic FE	NO	NO	YES	YES	YES	YES	YES
Orthog. Inst.	NO	NO	NO	NO	YES	YES	YES
Instrumented Inst.	NO	NO	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 controlled for by construction. With the tetrads in regression 4, standard errors are 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 6 and 7, 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.
Source: own calculation

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 Kunčič (2012), we define institutional quality dummies on legal, economic and political institutional differences as being one, if the orthogonal institutional distance is less than one standard deviation (narrow homogeneity), or three standard deviations of the sample (broad homogeneity) in each year. 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.

Table 4: Institutional homogeneity

dep. var: ln(exports)	< 1 std. dev. 1	< 1 std. dev. 2	< 3 std. dev. 3	< 3 std. dev. 4
ln(pop_o)	0.146 (0.102)	0.260*** (0.100)	0.143 (0.102)	0.251** (0.100)
ln(pop_d)	1.343*** (0.0943)	1.448*** (0.0928)	1.342*** (0.0942)	1.441*** (0.0927)
ln(gdpcap_o)	0.548*** (0.0312)	0.538*** (0.0311)	0.544*** (0.0310)	0.530*** (0.0309)
ln(gdpcap_d)	0.648*** (0.0295)	0.679*** (0.0291)	0.644*** (0.0295)	0.671*** (0.0291)
rta	0.253*** (0.0256)	0.262*** (0.0257)	0.257*** (0.0256)	0.266*** (0.0256)
wto	0.140*** (0.0297)	0.137*** (0.0299)	0.141*** (0.0298)	0.136*** (0.0299)
common_currency	0.132*** (0.0375)	0.0986*** (0.0379)	0.136*** (0.0374)	0.0999*** (0.0378)
acp_to_eu	-0.793*** (0.109)	-0.791*** (0.109)	-0.786*** (0.109)	-0.785*** (0.109)
legal_inst_o	0.169*** (0.0243)		0.168*** (0.0243)	
political_inst_o	-0.0545** (0.0258)		-0.0586** (0.0259)	
economic_inst_o	-0.0436** (0.0206)		-0.0468** (0.0207)	
legal_inst_d	0.0273 (0.0246)		0.0264 (0.0247)	
political_inst_d	0.0884*** (0.0245)		0.0849*** (0.0247)	
economic_inst_d	0.0547** (0.0213)		0.0510** (0.0213)	
abs(legal_diff)<xSD	-0.00268 (0.0117)	0.00971 (0.0117)	-0.0275 (0.0243)	0.00263 (0.0240)
abs(political_diff)<xSD	-0.0312** (0.0126)	-0.0210* (0.0124)	-0.0642** (0.0260)	-0.0441* (0.0255)
abs(economic_diff)<xSD	0.00704 (0.0118)	0.0133 (0.0118)	0.142*** (0.0280)	0.162*** (0.0280)
Constant	1.621*** (0.586)	0.879* (0.526)	1.639*** (0.586)	0.923* (0.524)
Observations	184,622	184,622	184,622	184,622
R-squared	0.882	0.882	0.882	0.882
Time FE	YES	YES	YES	YES
Exporter FE	YES	YES	YES	YES
Importer FE	YES	YES	YES	YES
Dyadic FE	YES	YES	YES	YES
Orth. Inst.	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Country pair robust standard errors in parentheses.

Source: own calculation

Lastly, there are still a variety of interactions which can be interesting to look at, which we do in

Table 5 for countries countries sharing a RTA, WTO membership, or currency, but concentrate on the heterogenous effects of institutional distance (the empirical evidence points to the direction of being able to test the effect of institutional distance without controlling for institutional levels). Regressions 1 to 3 include RTA, WTO and common currency interactions gradually, while regression 4 includes all interactions simultaneously. With the differential effect of institutional distance on countries sharing a regional trade agreement, we find that both effects of institutional distances, the positive effect of political institutional distance as well as the negative effect of economic institutional distance, disappear for the countries within the same RTA. However, only around 12% of country-pair-year observations are in fact in a RTA, so the general effects of both institutional distances remain. Since 82% of observations in the sample are members of WTO, the general effect of political institutional difference is in fact first and foremost for this group, while the general effect of economic institutional distance remains for all. Finally, the specific effect of institutional distance within countries sharing a common currency (only a bit over 1% of observations) seems to be a much larger negative effect of political institutional distance, which shows that the possible problem of alternative ways to enhance trade between a country with good political institutions and a country with bad political institutions is exacerbated within areas using same currency.

Table 5: Heterogenous effects of institutional distance

dep. var: ln(exports)	1	2	3	4
ln(pop_o)	0.263*** (0.100)	0.262*** (0.1000)	0.258*** (0.100)	0.256** (0.100)
ln(pop_d)	1.455*** (0.0928)	1.453*** (0.0931)	1.450*** (0.0928)	1.449*** (0.0932)
ln(gdpcap_o)	0.529*** (0.0309)	0.530*** (0.0309)	0.530*** (0.0309)	0.530*** (0.0309)
ln(gdpcap_d)	0.670*** (0.0290)	0.670*** (0.0290)	0.670*** (0.0290)	0.671*** (0.0290)
rta	0.259*** (0.0341)	0.266*** (0.0256)	0.263*** (0.0256)	0.254*** (0.0345)
wto	0.140*** (0.0299)	0.161*** (0.0484)	0.140*** (0.0299)	0.163*** (0.0487)
common_currency	0.109*** (0.0382)	0.0921** (0.0381)	-0.0239 (0.0992)	-0.0184 (0.0996)
acp_to_eu	-0.774*** (0.109)	-0.776*** (0.109)	-0.775*** (0.109)	-0.774*** (0.109)
abs(legal_diff)	-0.0139 (0.0197)	0.0701 (0.0442)	-0.0133 (0.0186)	0.0693 (0.0442)
abs(political_diff)	0.0557*** (0.0194)	-0.00985 (0.0412)	0.0518*** (0.0184)	-0.00659 (0.0413)
abs(economic_diff)	-0.0894*** (0.0177)	-0.0684* (0.0387)	-0.0845*** (0.0165)	-0.0723* (0.0389)
abs(legal_diff)*rta	-0.00170 (0.0448)			0.00449 (0.0460)
abs(legal_diff)*wto		-0.101** (0.0479)		-0.103** (0.0482)
abs(legal_diff)*common_currency			0.0782 (0.141)	0.0934 (0.144)
abs(political_diff)*rta	-0.0829* (0.0456)			-0.0771* (0.0465)
abs(political_diff)*wto		0.0743* (0.0435)		0.0777* (0.0437)
abs(political_diff)*common_currency			-0.257* (0.152)	-0.223 (0.155)
abs(economic_diff)*rta	0.0890** (0.0358)			0.0799** (0.0361)
abs(economic_diff)*wto		-0.0174 (0.0413)		-0.0224 (0.0414)
abs(economic_diff)*common_currency			0.568*** (0.182)	0.520*** (0.183)
Constant	1.018* (0.524)	0.995* (0.527)	1.031** (0.524)	1.018* (0.527)
Observations	184,622	184,622	184,622	184,622
R-squared	0.882	0.882	0.882	0.882
Time FE	YES	YES	YES	YES
Exporter FE	YES	YES	YES	YES
Importer FE	YES	YES	YES	YES
Dyadic FE	YES	YES	YES	YES
Orthog. Inst.	YES	YES	YES	YES

Notes: *** p<0.01, ** p<0.05, * p<0.1. Country pair robust standard errors in parentheses.
Source: own calculation

6 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 Kunčič (2013), 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. There are also some important heterogeneities, most interestingly, that the effects of political and economic institutional distances disappear for countries sharing the same regional trade agreement.

This paper focuses on the general effect of institutions and institutional distance on bilateral trade. We show that institutions do matter in bilateral trade, and that not all types of institutions have

the same marginal effect. Moreover, we emphasize the importance of inclusion of institutional distance, which is generally overlooked in the literature.

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