THE GRAVITY OF INSTITUTIONS

Cindy Duc, Emmanuelle Lavallée & Jean-Marc Siroën[1]

ABSTRACT. Do good institutions foster trade? Many trade agreements, and notably those of the European Union, introduce institutional provisions in addition to strictly free-trade measures. In this article, we are interested in the influence of democracy and the fight against corruption on trade. We use a gravity model inspired and adapted from Anderson and van Wincoop (2003) but estimated with a Poisson Pseudo-Maximum Likelihood (PPML) method, which circumvents the heteroskedasticity bias encountered with the usual Ordinary Least Square (OLS) estimators. We analyze the effects of institutional similarities on bilateral trade, before regressing the country fixed-effects to test for the consequences of democracy and the fight against corruption on trade for all countries. Our results show that democratic countries are generally more open, but that two democratic nations do not necessarily trade more between each other. The reverse is true for corruption.

JEL Classification: F15; F17; P33; P37; P48.
Keywords: International Trade; Gravity Models; Governance; Democracy; Corruption.

RÉSUMÉ. Les bonnes institutions favorisent-elles le commerce ? De nombreux accords commerciaux, au premier rang desquels, l'Union européenne, introduisent des clauses institutionnelles en plus des dispositions strictement commerciales. Dans cet article, nous nous intéressons à l'influence de la démocratie et de la lutte contre la corruption sur le commerce. Nous utilisons un modèle de gravité, inspiré de Anderson et van Wincoop (2003) mais estimé par la méthode du pseudo maximum de vraisemblance à partir d'une loi de Poisson, ce qui évite les biais d'hétéroscédasticité inhérents aux estimateurs des moindres carrés ordinaires. Nous analysons les effets de la similarité des institutions sur le commerce bilatéral, puis nous régressons les effets fixes pays pour tester les effets de la démocratie et de la lutte contre la corruption sur le commerce pour l'ensemble des pays. Nos résultats montrent que les pays démocratiques sont plus ouverts mais que deux pays démocratiques n'échangent pas davantage entre eux. C'est l'inverse qui est constaté pour la corruption.

Classification *JEL* : F15 ; F17 ; P33 ; P37 ; P48.
Mots-clés : Commerce international ; modèles de gravité ; gouvernance ; démocratie ; corruption.

1. Corresponding author: Jean-Marc SIROËN, Professor, EURIsCO, Université Paris-Dauphine (siroen@dauphine.fr).
Cindy DUC, *PhD* in Economics, Researcher at EURIsCO, Université Paris-Dauphine ; Emmanuelle LAVALLÉE, *PhD* in Economics, Research Fellow at DIAL (Développement, Institutions et Analyse de Long terme).

INTRODUCTION

Good institutions and good governance are crucial for international trade. They are assumed to foster trade by decreasing the costs and the risks inherent to international trade. Since Anderson-Marcouiller's (2002) seminal paper, an increasing body of literature has repeatedly shown the deleterious effects on trade of ill-functioning institutions (for instance, see Lavallée, 2006; Babetskaia-Khukharchuk and Maurel, 2004; de Sousa and Disdier, 2006). The estimated effects of institutional weakness on trade are generally large. For instance, in 2002, Anderson and Marcouiller found that if their seven selected Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela) were to enjoy the same transparency and enforceability scores as the mean ratings of European Union (EU) members, then Latin American imports would increase by 30%. In the same vein, several papers have found that similar governance qualities have a significant and positive impact on bilateral trade flows (Cheptea, 2007; de Groot *et al.*, 2005).

Most of these articles have focused on institutions that are linked to the implementation and enforcement of laws or contracts. They have not dealt with some aspects of good governance such as the respect of democratic principles or corruption, and therefore their resulting impacts on trade are highly controversial. With regards to democracy, although empirical evidence suggests that trade is significantly and positively influenced by democracy (Kubota and Milner, 2005; Lundström, 2005; Bliss and Russet, 1998), there is still no theoretical consensus on the expected impact of democracy on trade; the theoretical debate continues on the influence of democracy on the design of trade policy (Mayer, 1984; Rogowski, 1989). With respect to corruption, the theoretical and empirical literature argues that globally corruption has a negative impact on trade. But some authors consider that corruption may also be beneficial in countries where other aspects of governance are defective (Bhagwati, 1982). At the empirical level, the debate is still open. Lavallée (2006) invalidates second-best theories that see corruption as a way "to grease the wheels of trade" in countries where the regulatory burden is high, whereas Dutt and Traca (2007) show that while corruption impedes trade in an environment of low tariffs, high nominal tariffs may create trade enhancing effects.

This short overview of the institutions and trade nexus raises two questions: can the results on the quality of judicial frameworks generally be applied to democracy and corruption? Are they robust enough with respect to newer developments in gravity equation estimations? This paper aims at properly testing with cross-sectional data the impact of democracy and corruption on international trade. More specifically, our empirical analysis seeks to assess the impact of institutions on trade using the Anderson-van Wincoop specification of the gravity equation, estimated with PPML.

This paper is organized as follows: section 2 briefly outlines the expected impact of democracy and corruption on trade, section 3 presents the specification of the gravity equation used and our empirical strategy, section 4 displays the empirical results, and section 5 concludes.

■ THE CONTROVERSIAL IMPACTS OF CORRUPTION AND DEMOCRACY ON TRADE

We focus on two specific and emblematic aspects of governance, corruption and democracy. The empirical literature has recently explored their impact on trade, even though results obtained are highly controversial.

The impact of democracy

Although democracy is always considered to have an impact on trade through the design of trade policies, various studies have yielded highly different results. The simplest ones conclude that democratic regimes are an impediment to trade because they are less able to impose unpopular reforms (Edwards, 1992), or that they are more likely to leave free course to pressures from protectionist rent-seeking lobbies that may actually represent an obstacle to economic freedom (Olson, 1982). In democratic countries, industrial lobbies rather than pro-trade consumers are more likely to be rent-seekers, because it is easier to control free-riding behaviors inside smaller groups than within larger ones. What politicians risk losing in votes may be regained through the financial support they receive from protectionist groups (Baldwin, 1989; Magee, Brock and Young, 1989; Grossman and Helpman, 1994).

The inclusion of median voter theorem in theoretical models leads to more contrasted results. Democracy actually enlarges the electoral group, which displaces median voter locations (Kubota and Milner, 2005). However, the direction of influence varies with the relative factor endowment of countries (Mayer, 1984). With the Stolper-Samuelson theorem, democratic capital-abundant countries are more protectionist because the median voter has more chance to be a trade-losing worker (see Dutt and Mitra, 2002 for empirical evidence).[2] Moreover, where voters are considered as consumers instead of as workers, the median voter should be more favorable to trade openness: "*Political leaders may have to compensate more voting consumers for the same level of protection [...] an increase in the size of the electorate and thus the winning coalition may change political leaders' optimal policy in the direction of freer trade.*" (Kubota and Milner, 2005).

The evolution towards free trade and democracy might discredit the idea that protectionist lobbies dominate democratic countries. Since the 1970s, countries have simultaneously experienced a "rush to free trade" and a "rush to democracy", in Southern and Eastern Europe, as well as in Latin America. Since the 1960s, Giavazzi and Tabellini (2006) consider that 23 countries have democratized before liberalizing; nine experienced the opposite progression.

Furthermore, several empirical studies suggest that there is a positive relationship between democracy and trade. Rosendorff (2006) finds that democratic regimes result in incentives to

---

2. See Rogowski (1989) and O'Rourke and Taylor (2006) for a generalization in a three-factor model (labor, capital and land).

unilateral openness. In trade tariff negotiations, a democracy offers more concessions to another democracy than to an autocracy. Kubota and Milner (2005) and Lundström (2005) find a negative and significant relationship between democracy and restraints in international trade. Bliss and Russet (1998) find that bilateral trade is significantly and positively influenced by democracy. And for Mansfield *et al*. (2000, 2002), mixed pairs (one democratic, the other autocratic) trade less than democratic pairs.

The impact of corruption

The specific impact of corruption on trade has been far less explored than the one for democracy. It is often compared to the effect of other institutional failures. A low quality of institutions is generally expected to deter international trade by raising risks and international trade costs. Anderson and Marcouiller (2002) show that imperfect contract enforcement and predation increase the risks inherent to international transactions. Their import model shows that trade insecurity reduces bilateral imports because it increases the price of tradable goods in the same way as a hidden tax or tariff.

Moreover, as underlined by Méon and Sekkat (2004), corruption may have an indirect impact on trade *via* its effects on the key determinants of international trade. For instance, corruption dramatically reduces the quality of domestic investments (Mauro, 1995) that are a key determinant of trade (Rodrik, 1995; Elbadawi, 2002). Furthermore, institutional weakness is often linked to low public expenditures devoted to the maintenance of public infrastructures (Mauro, 1998), elements to which trade flows are very sensitive (Limao and Venables, 2001).

However, such findings contrast sharply with older theories advocating that corruption may actually be beneficial in the second-best world by mitigating distortions caused by poorly-functioning institutions (Leff, 1964; Huntington, 1968). Corruption may facilitate the functioning of the economy by "greasing its wheels". This idea was developed in a number of theoretical analyses showing that corruption results in efficiency. For instance, Beck and Maher (1986) and Lien (1986) demonstrate that granting a public government contract to the enterprise that offers the highest bribes results in selecting the most efficient firms, because the ranking of bribes reflects the efficiency rankings of those companies. In the area of international trade, Bhagwati (1982, p.993) suggests that corruption be analysed as a "*Directly Unproductive Profit-seeking activity*" (DUP), *i.e.*, a way to making profits without undertaking activities that are directly productive. In this conceptual framework, the effects of corruption can be compared to those of tariff evasion or smuggling. If distortions previously exist, these activities actually increase general well-being. Although these theories do not directly analyze the effects of corruption on international trade, they point to corruption as a way of easing trade into countries plagued by red tape or high tariffs.

Only two empirical studies specifically analyze the effects of corruption on international trade (Lavallée, 2006; Dutt and Traca, 2007). Both conclude that corruption is associated with lower bilateral trade. But their findings concerning the validity of the "grease the wheels" theories are radically opposed. Lavallée (2006) invalidates second-best theories which see

corruption as a way "to grease the wheels of trade" in countries where the regulatory burden is high, whereas Dutt and Traca (2007) show that while corruption impedes trade in an environment of low tariffs, it may actually create trade enhancing effects when nominal tariffs are high.

■ EMPIRICAL STRATEGY AND DATA

This paper aims at assessing the impact on trade of two aspects of public institutions that have been neglected in institutional and trade nexus literature. To do so, we use the latest developments regarding specification and estimation in a cross-country context of gravity equations on trade. We choose to use cross-sectional analyses instead of panel data for different reasons. First, we want to explore new kinds of estimations initiated by Anderson and van Wincoop (2003) and later used by Santos Silva and Tenreyro (2006) which are tested in cross-section. Second, even if panel estimations have the great advantage of comparing data in time, the introduction of multilateral resistance to reduce estimation bias is always highly controversial (see Egger and Pfaffermayr, 2003; Baldwin and Taglioni, 2006; Baldwin, 2006). For example, fixed-effects (specific to a country or a pair of countries) are pertinent proxies for multilateral resistance only if we assume them to be time-invariant, which cannot be the case.

A gravity model *à la* Anderson and Van Wincoop

We use the specification of the gravity equation proposed by Anderson and Van Wincoop (2003, 2004). In a monopolistic competition framework, these authors demonstrate that in a one-sector economy where consumers have CES preferences with a common elasticity among all goods ($\sigma > 1$), the gravity equation can be written as:

$$X_{ij} = \frac{Y_i Y_j}{Y_w} \left(\frac{t_{ij} \Pi}{\Pi_i P_j} \right)^{1-\sigma} \tag{1}$$

$$P_j^{1-\sigma} = \sum_i \Pi_i^{\sigma-1} \theta_i t_{ij}^{1-\sigma} \forall j \tag{2}$$

$$\Pi_i^{1-\sigma} = \sum_j P_j^{\sigma-1} \theta_j t_{ij}^{1-\sigma} \tag{3}$$

where Y_i et Y_j are levels of GDP, Y_w is world GDP, θ_i is the income share of country i, and t_{ij} are costs associated to trade from country i to country j ($t_{ij} \geq 1$). With the symmetry of trade costs ($t_{ij} = t_{ji}$), $\Pi_i = P_i$ and equation 1 then becomes:

$$X_{ij} = \frac{Y_i Y_j}{Y_w} \left(\frac{t_{ij}}{P_i P_j} \right)^{1-\sigma} \tag{4}$$

Price indexes P_i and P_j are "multilateral resistance" terms. They summarize the average trade resistances between a country and all its trading partners. If there is a consensus to consider

price indexes in gravity equations, other methods have been proposed to tackle or circumvent inherent difficulties (see for example, Head and Mayer, 2000). However, the advantage of country fixed effects is to quantify "multilateral resistance" in a way that integrates omitted variables and makes possible the isolation of "bilateral" and "unilateral" effects of institutional variables.

Estimation methodology

Our estimation methodology is designed to take into account two issues. The first is directly linked to multilateral resistance terms. Following in the steps of Anderson and Van Wincoop (2003) and Feenstra (2004), we choose to model multilateral resistance by introducing exporter and importer specific effects rather than estimating P_i and P_j with complex nonlinear estimation techniques. However, this choice leads to an additional issue: unilateral variables such as income or national institutions are perfectly collinear with country (export and import) fixed effects. Then, we can only introduce bilateral (dyadic) variables. In order to capture the influence of democracy and corruption on trade, we have adopted a strategy that allows the disentanglement of the bilateral and multilateral effects of institutions on trade. The rationale behind this is that the quality of a country's institutions does not vary depending on its trade partners. Therefore, one is allowed to think that the quality of institutions has a direct impact on its multilateral resistance to trade. However, national institutions can be more or less similar to one of its trading partners and therefore impact bilateral trade costs, since institutional similarities have been shown to be trade enhancing.

The second issue deals directly with the empirical methods used to estimate gravity equations. There is a long tradition of log-linearizing (equation 4) and estimating the variables of interest by OLS. However, Santos Silva and Tenreyro (2006) show that heteroskedasticity is a frequently underestimated issue for gravity models, even when a Huber-White estimator is used, and that OLS-estimated elasticities can be highly misleading in the presence of heteroskedasticity. To bypass these problems, Santos Silva and Tenreyro (2006) advocate testing trade variables in levels, *i.e.*, to test X_{ij} instead of Log (X_{ij}), and using a robust Poisson Pseudo-Maximum Likelihood (PPML) estimator because it produces estimates that are robust to heteroskedasticity (Winkelmann, 2003). This method of estimation also permits taking into account zero trade flows (which represent 28% of our sample) because the Log(0) issue disappears. However, to consider nil values does not deal with the issue of censored variables (cannot be negative). The zero-inflated Poisson regression (ZIP) we use has the feature of specifying an equation that determines whether the observed trade flow is zero or not.

We will therefore proceed in three steps. First, we will compare different methods of estimation to adopt the most fitting one as a benchmark for other estimations. Second, we will estimate the trade impact of dissimilarities between national institutions. Finally, we will estimate importer and exporter fixed-effects to assess the impact of institutions on multilateral resistance to trade.

Data

The sample concerns 145 countries in the year 2000 (see ANNEX 1). Hence, our dataset consists of 20,880 observations of bilateral export flows (145*144 country pairs). The information on bilateral exports comes from the International Monetary Fund Data on Trade Statistics (DOTS). Data on GDP come from the World Bank's World Development Indicators (2002). Data on distance and dummies indicating contiguity, common language, colonial ties (direct and indirect links) are taken from CEPII's "Distance" database. Dummies indicating a common membership in a preferential trade agreement or in the World Trade Organization (WTO) are computed with data from the WTO.

To measure the quality of democracy, we use two databases: Polity IV and Freedom House. Polity IV quantifies the quality of a political regime according to four components, which are openness of elections, competition in executive recruitment, executive constraints and participation competition. It scores countries from –10 to 10 with 10 representing a pure democracy such as the United States or France. Freedom House's ranking quantifies the quality of a political regime according to election competition, representation of voters, the right to create a political union and the existence of an active opposition. It records countries from 1 to 7, with 1 indicating a "free" country, *i.e.*, a democracy.

To measure corruption, we use the *International Country Risk Guide* (ICRG) index produced by the country risk ranking agency, Political Risk Services Group. Indicators are ranked from 0 to 6, with 6 denoting a low level of corruption.

◼ RESULTS

First, we compare different iterations of the gravity model to select the "preferred" one as a benchmark for the following tests. Second, we introduce the variables of institutional similarity to quantify their influence on bilateral trade. Since we cannot introduce country-specific variables in the equation, we finally explain the country fixed-effects with these voluntarily omitted variables.

Benchmark estimations

In a first step, we highlight the differences that are introduced when implementing the various estimation techniques.

More precisely, we estimate with a gravity equation directly derived from equation 4. We simply add trade cost proxies such as distance, or dummies for contiguity, common language, colonial ties and common membership in the WTO or a free-trade agreement as elements of trade policy between a pair of countries. It is worthy to note that we introduce a specific dummy for European Union (EU) membership. Indeed, the EU requires specificities such as "deep integration process" and "high density" that justify the EU being distinguished from other preferential trade agreements.

TABLE 1 contains the estimation outcomes resulting from the various techniques used. The first column presents OLS estimates using the logarithm of exports as a dependent variable. This regression leaves out pairs of countries with zero bilateral trade. Results are similar to those usually encountered in the literature with a relatively high value for negative distance elasticity and a significant negative sign for EU membership. Nevertheless, a simple analysis of our residuals and the fitted value confirms the presence of heteroscedasicity in our regression (see FIGURE A2.1, ANNEX 2).

The second and third columns contain PPML estimates. In the second column, estimations are performed on the whole sample, whereas in the third, zero values are dropped. This latter estimation is made in order to check that changes in the estimates are driven by the estimation technique rather than the inclusion of nil values for some trade flows. In comparison with OLS estimation, PPML estimation dramatically reduces distance and common language coefficients. The most dramatic difference, not considered by Santos Silva and Tenreyro, is that the EU dummy is now positive and highly significant. This change might result from the geographic specificities of the EU: high distance elasticity in the previous estimation gave an inflated bonus to trade between near-by countries, as is prevalent in intra-European trade, which had to be corrected by a negative sign for EU membership. Reducing this elasticity gives the EU estimations more of a chance of having the correct sign.

The fourth and fifth columns show the results obtained using a zero-inflated Poisson regression (ZIP). We select and test two determinants of zero trade flows: distance between the two trading partners and the product of their GDP. These two estimations do not impact either the sign or the significance of our coefficients estimates. Nonetheless, in both cases, the Vuong Test which compares the ZIP and PPML estimations indicates that a ZIP estimation should be used rather than a PPML one. For our next analysis, we choose using Chi2 criteria to make Model 4 (with distance as the explanatory variable of zero trade flows) the benchmark.

Do institutions influence bilateral trade costs?

In a second step, we analyse the effect of institutions on bilateral trade. Given the fact that in a cross-sectional context, the introduction of exporter and importer specific effects does not allow the estimation of unilateral variables such as the quality of domestic institutions, we focus on the effect of institutional similarity on bilateral trade. Therefore, we have built indicators capturing similarity in national institutions.[3] We first determine a threshold to rank countries in two categories: democratic and non-democratic (corrupt or non-corrupt). For the Polity indicator, the usual threshold is 7 (Mansfield and Pevehouse, 2006; Kadera *et al*., 2003); for Freedom House, we use a score of 3[4]; for the ICRG index, we use the

---

3. A simple aggregation of our index by pair is not relevant to reflect similarity. For example, if we sum the indicators of Freedom House, a score of 5 would identify two democratic countries (2 + 3), as well as a democracy and an autocracy couple (1 + 4); the same interpretation can be made for a multiplication (6 is the result of 2*3, but also of 1*6).
4. The score of 4 which completes the sample "Partially Free" of the indicator is considered to be too heterogeneous (Kuwait, Morocco, Jordan or Armenia).

Table 1 -   Different estimations for the gravity model

Endogenous variable	$LogX_{ij}$	X_{ij}	X_{ij}	X_{ij}	X_{ij}
	OLS	PPML	PPML	ZIP	ZIP
			$X_{ij} > 0$ only		
	1	2	3	4	5
Distance *ij*	−1.50***	−0.66***	−0.66***	−0.66***	−0.66***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Former colony	1.07***	0.16*	0.16*	0.16*	0.16*
	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)
Contiguity	0.64***	0.56***	0.55***	0.55***	0.55***
	(0.11)	(0.07)	(0.07)	(0.07)	(0.07)
Common language	0.77***	0.12**	0.11*	0.11*	0.11*
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
WTO	0.50***	0.54***	0.56***	0.56***	0.56***
	(0.13)	(0.15)	(0.15)	(0.15)	(0.15)
Trade agreements without EU	0.51***	0.61***	0.60***	0.60***	0.60***
	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)
European Union (EU)	−0.76***	0.75***	0.76***	0.76***	0.76***
	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)
Constant	9.55***	18.69***	18.72***	18.72***	18.72***
	(0.46)	(0.65)	(0.65)	(0.65)	(0.65)
Endogenous variable: $X_{ij} = 0$					
Distance *ij*				0.580**	
				(0.02)	
Pibij					−0,552**
					(0.09)
Constant				−6,006**	24,851**
				(0.19)	(0.42)
Importer and exporter fixed effects	yes	yes	yes	yes for $X_{ij} > 0$	yes for $X_{ij} > 1$
Observations	13,749	19,120	13,749	19,120	19,120
Observations > 0		13,749		13,749	13,749
Observations = 0		5,371		5,371	5,371
R-squared	0.74				
Chi2		146,588.32	139,334.68	139,337.04	139,337.02
Pseudo R^2		0.96	0.95		
Test ZIP vs Poisson				7.52** (ZIP better)	7.54*** (ZIP better)

Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

median of our sample as the threshold. We then create three new dummy variables by indicator. The first represents two democratic (respectively corruption free) countries (our variable is equal to one if both countries are democratic and zero otherwise), the second for two autocratic countries and the third for a mixed pair. The first two indicate an institutional similarity and the last one, an institutional dissimilarity. We can only estimate two of these variables, the third one being used as a reference. We choose to analyze the impact of institutional similarity (both democratic and both autocratic) and to compare it to the "mixed" situation of dissimilarity.

The theoretical prediction is ambiguous. We can consider that two similar countries have an informational advantage to manage trade between each other, resulting in lower trade costs. However, similarity may be differently trade-increasing for democratic pairs and for autocratic ones, and this is exactly why we have kept both variables of similarity. In contrast, dissimilarity creates differences and competitive advantages, which should create trade. As a result, we can speculate that institutions influence the choice of specialization, inducing complementary trade between countries having contrasting regimes (see Levchenko, 2006, for a a theoretical framework and empirical results).

TABLE 2 shows that we cannot conclusively rule on the impact of institutional similarity on bilateral trade. Indeed, both indicators of democracy give opposite results. The coefficient is positive for the Freedom House index for a pair of democratic countries, but not significantly. It is poorly significantly negative for a pair of autocracies. The signs are inversed with the Polity index: the negative sign for a pair of democratic countries means that they trade less between each other than if one of them was autocratic; two autocratic countries would trade more. In contrast, the absence of corruption seems to be unambiguously favorable to bilateral trade, and corruption is trade-adverse in mixed situations.

However, so far we have only considered the bilateral effects. The results do not imply that a democratic/honest country trades more or less with all its potential partners because multilateral resistance has only been used as a variable to control for all country-specific characteristics.

Do institutions influence multilateral resistance?

In a third step, we study the impact of democracy and corruption on multilateral resistance. To do so we use the exporter and importer fixed effects that have been estimated in previous regressions (TABLE 2, Models 1, 2 and 3) as proxies of multilateral resistance to trade (Mélitz, 2005). TABLE 3 presents the estimation results respectively for exporter and importer specific effects. All equations include the usual unilateral determinants used in cross-section gravity models when country-fixed effects are not introduced: area, landlocked (no access to sea), remoteness (see ANNEX 3).[5] We have added our variable of interest concerning democracy

---

5. Many other variables of control, including trade policy indicators, have unsuccessfully been tested.

Table 2 - The Influence of similarity in democracy and corruption on bilateral trade (with PPML estimators)

	FH 1	Polity IV 2	IRCG 3
Distance *ij*	−0.67***	−0.67***	−0.66***
	(0.03)	(0.03)	(0.03)
Former colony	0.55***	0.55***	0.55***
	(0.07)	(0.07)	(0.07)
Contiguity	0.16*	0.15	0.16*
	(0.09)	(0.09)	(0.09)
Common language	0.13**	0.14**	0.12**
	(0.06)	(0.06)	(0.06)
WTO	0.80***	0.67***	0.81***
	(0.18)	(0.16)	(0.14)
Trade agreements without EU	0.60***	0.59***	0.59***
	(0.07)	(0.07)	(0.07)
European Union (EU)	0.76***	0.74***	0.76***
	(0.09)	(0.09)	(0.10)
Constant	−1.04*		
	(0.61)		
Freedom House (both democratic)	0.73		
	(0.58)		
Freedom House (both autocratic)	−1.04*		
	(0.61)		
Polity IV (both democratic)		−2.05***	
		(0.45)	
Polity IV (both autocratic)		1.69***	
		(0.45)	
ICRG (both honest)			1.82***
			(0.61)
ICRG (both corrupted)			−2.27***
			(0.62)
Constant	16.27***	16.43***	14.89***
	(0.66)	(0.65)	(0.73)
Endogenous variable: $X_{ij} = 0$			
Distance *ij*	0.58***	0.58***	0.58***
	(0.02)	(0.02)	(0.02)
Constant	−6.01***	−6.01***	−6.01***
	(0.19)	(0.19)	(0.19)
Importer and exporter fixed effects	yes for $X_{ij} > 0$	yes for $X_{ij} > 0$	yes for $X_{ij} > 0$
Observations	19,120	19,120	19,120
Chi2	140,966.52	140,492.50	134,727.26
Vuong test	7.88	8.44	7.70

Robust z statistics in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

and corruption. When we use the same database as in previous equations, institutional variables are very different. In the previous step we use dyadic variables, built from dummy variables (democratic or not, corrupted or not). In this step we are only concerned by the institutional performance of the country, using a continuous indicator.

Table 3 - The influence of democracy and corruption on fixed effects (multilateral resistance)

	Explained variable: Country fixed effects (from TABLE 2)					
Country-specific variable	Freedom House (col. 1)		Polity (col. 2)		ICRG (col. 3)	
	Export	Import	Export	Import	Export	Import
Log current GDP	0.738 (9.62)***	0.760 (12.96)***	0.818 (9.99)***	0.814 (12.78)***	0.895 (8.46)***	0.881 (9.48)***
Log current GDP per capita	0.623 (6.11)***	0.317 (3.59)***	0.716 (6.85)***	0.463 (4.94)***	0.443 (2.32)**	0.164 (0.86)
Log area	0.116 (1.60)	−0.044 (0.89)	0.097 (1.38)	−0.042 (0.84)	0.132 (1.49)	−0.028 (0.42)
Landlocked	−0.316 (1.62)	−0.421 (3.22)***	−0.218 (0.98)	−0.338 (1.96)*	−0.488 (2.09)**	−0.651 (2.94)***
Log remoteness	0.047 (0.34)	−0.015 (0.15)	0.242 (1.46)	0.151 (1.14)	0.071 (0.34)	0.032 (0.19)
Freedom House (political rights)	0.289 (7.78)***	0.166 (5.51)***				
Polity			0.089 (6.15)***	0.130 (11.12)***		
ICRG					−0.527 (3.55)***	−0.320 (2.15)**
Constant	5.121 (1.34)	3.561 (1.27)	11.885 (2.72)***	6.404 (1.71)	6.084 (1.09)	3.262 (0.67)
Observations	134	135	133	132	145	144
R-squared	0.85	0.89	0.88	0.92	0.76	0.75

Robust z statistics in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

We verify that income elasticities are close and inferior to one (TABLE 3). GDP per capita is always positive and significant, except when it is coupled with a corruption index (column 3). To be landlocked diminishes trade between all partners, but the variable is not always significant. Other variables of control (area, remoteness) are never significant (this is also the case for the trade policy indicators we introduced). Democracy always increases overall trade, whatever the index. Conversely, honesty decreases overall trade.[6]

6. Concerning institutional variables, ambiguous effects identified by theoretical and empirical literature might be isolated by non-linear (quadratic) specifications. However, the estimations we made do not fit better than the ones with linear relations.

The method therefore leads to non-intuitive results: a democratic country tends to trade more with all countries but there is no evidence that similarity in political institutions reduces bilateral trade costs. For corruption, the results are inversed: less corrupted countries trade more between each other, but are relatively less open than corrupted countries.

◼ CONCLUSION

The aim of this article was to consider the influence of institutional variables on trade. We used a cross-sectional analysis with Poisson Pseudo-Maximum Likelihood (PPMI) estimators which correct the heteroskedasticity bias common in log-linear gravity models, and ZIP estimations to deal with zero variables. The most important impacts concern trade elasticity of distance (which is reduced), colonial ties (with non-significant coefficients) and European Union membership (which becomes significantly positive).

Contrary to the often-used hypothesis, we cannot find any evidence that institutional proximity always reduces trade costs and fosters bilateral trade. Evidences are not robust to the index of democracy, but it does not appear that a pair of democracies trades more than a mixed pair, or even a pair of autocracies. However, the similarity hypothesis works well with the index of corruption. Two honest countries tend to trade more between each other.

We regressed country fixed effects to isolate the institutional components of "multilateral resistance", which concerns trade with all countries, not specifically with anyone. Institutions ambiguously affect export country fixed effects but in an opposite sense. If democracy does not preferentially increase trade with another democratic country, a democratic country should trade more with all countries. It is the converse effect that is true for corruption. Honest countries trade relatively more between each other, but globally trade less than less honest countries.

The next step is to make progress in the quantification of the different aspects of democracy and corruption, which might exert varying and contradictory influences on trade. It is also necessary to pay attention to the national environments of institutions, and to test complementarity or substitutability between institutions and other variables such as trade policy, the level of development, and membership in international organizations.

In political terms, the dominant doctrine of "good governance" has to be implemented with caution because the virtuous circle between better governance, trade and growth has always been confronted with contradictory empirical evidence.

C. D., E. L. & J.-M. S.[7]

ANNEX 1

Table A1.1 -   The countries of the sample

Albania	Djibouti	Kenya	Rwanda
Algeria	Dominica	Korea	Samoa
Angola	Dominican Republic	Kuwait	Saudi Arabia
Argentina	Ecuador	Kyrgyz Republic	Senegal
Australia	Egypt	Lao, People's Democratic Republic	Sierra Leone
Austria	El Salvador	Latvia	Singapore
Azerbaijan	Equatorial Guinea	Lebanon	Slovak Republic
Bahamas, The	Estonia	Lithuania	Slovenia
Bahrain, Kingdom of	Ethiopia	Macedonia, FYR	South Africa
Bangladesh	Fiji	Madagascar	Spain
Barbados	Finland	Malawi	Sri Lanka
Belarus	France	Malaysia	Sudan
Belgium	Gabon	Mali	Sweden
Belize	Gambia, The	Malta	Switzerland
Benin	Georgia	Mauritania	Syrian Arab Republic
Bolivia	Germany	Mauritius	Tajikistan
Brazil	Ghana	Mexico	Tanzania
Bulgaria	Greece	Moldova	Thailand
Burkina Faso	Grenada	Mongolia	Togo
Burundi	Guatemala	Morocco	Trinidad and Tobago
Cambodia	Guinea	Nepal	Tunisia
Cameroon	Guinea-Bissau	Netherlands	Turkey
Canada	Guyana	New Zealand	Turkmenistan
Cape Verde	Haiti	Niger	Uganda
Central African Republic	Honduras	Nigeria	Ukraine
Chad	Hungary	Norway	United Kingdom
Chile	Iceland	Oman	United States
China, P.R.: Mainland	India	Pakistan	Uruguay
Colombia	Indonesia	Panama	Uzbekistan
Congo, Democratic Republic of	Iran, Islamic Republic of	Papua New Guinea	Venezuela, Rep. Bol.
Congo, Republic of	Ireland	Paraguay	Vietnam
Costa Rica	Israel	Peru	Yemen, Republic of
Côte d'Ivoire	Italy	Philippines	Zambia
Croatia	Jamaica	Poland	Zimbabwe
Cyprus	Japan	Portugal	
Czech Republic	Jordan	Romania	
Denmark	Kazakhstan	Russia	

ANNEX 2

Figure A2.1 -   Heteroskedasticity in Huber-White estimations: Distribution of errors

Heteroskedasticity
Model 1 of table 1
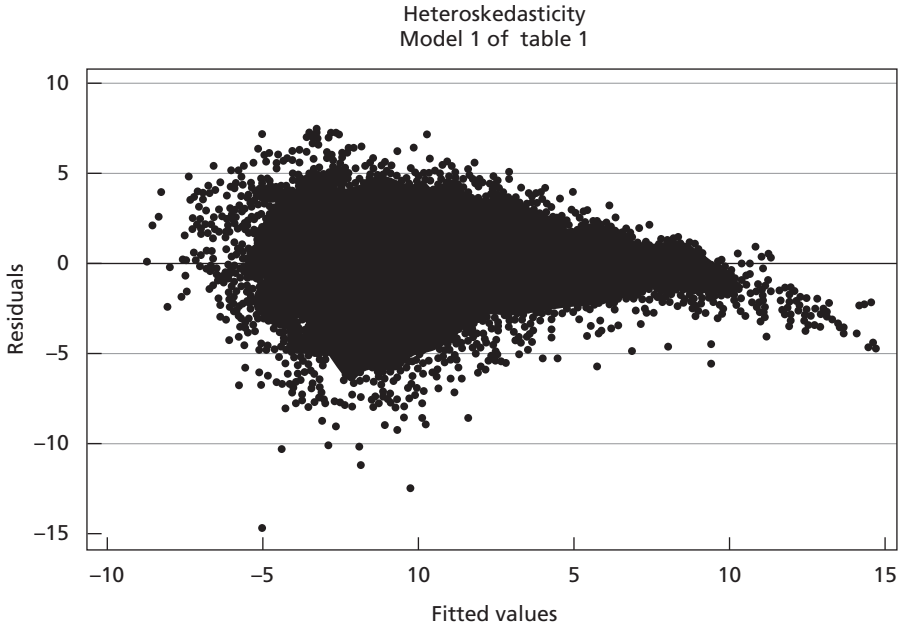
ANNEX 3

Data description

VARIABLE AND DESCRIPTION: X_{ij}, bilateral export from country i to country j, F.O.B, for 2000, million dollars;
SOURCE: IMF, Direction of Trade Statistics.

VARIABLE AND DESCRIPTION: GDP for 2000, million dollars;
SOURCE: World Bank, World Development Indicators 2004.

VARIABLE AND DESCRIPTION: D_{ij}, (distance ij), Kilometric Distance between the capital of countries i and j;
SOURCE: CEPII database, www.cepii.fr/francgraph/bdd/bdd.htm.

VARIABLE AND DESCRIPTION: Contiguity, binary variable equals to 1 if countries i and j share a border;
SOURCE: CEPII database, www.cepii.fr/francgraph/bdd/bdd.htm.

VARIABLE AND DESCRIPTION: Common language, binary variable equals to 1 if countries i and j share the same language;
SOURCE: CIA World Factbook, www.cia.gov/cia/publications/factbook.

VARIABLE AND DESCRIPTION: Colony, binary variable equals to 1 if country *i* or *j* was colonized by country *j* or *i*;
SOURCE: CEPII database, www.cepii.fr.

VARIABLE AND DESCRIPTION: WTO, binary variable equals to 1 if countries *i* and *j* are WTO members;
SOURCE: WTO, www.wto.org.

VARIABLE AND DESCRIPTION: Trade Agreements, binary variable equals to 1 if countries *i* and *j* are a member of the same trade agreement;
SOURCE: WTO, Frankel, J.A., 1997. *Regional Trading Blocs in the World Trading System*, Washington DC: Institute for International Economics.

VARIABLE AND DESCRIPTION: Freedom House, measure the respect of political rights (FH): indicator grading countries from 1 to 7, with 1 representing a total respect of political rights;
SOURCE: Freedom House Data, www.freedomhouse.org/ratings/index.htm.

VARIABLE AND DESCRIPTION: Polity, measure the respect of political rights (Polity IV). The indicator grades countries from –20 to 20, with 20 indicating a pure democracy;
SOURCE: www.cidcm.umd.edu/polity.

VARIABLE AND DESCRIPTION: ICRG, level of corruption of a country ranked from 0 to 7, where 7 reflects a high level of corruption;
SOURCE: International Country Risk Guide.

VARIABLE AND DESCRIPTION: Area of the country;
SOURCE: CEPII, www.cepii.fr/distance/geo_cepii.xls.

VARIABLE AND DESCRIPTION: Landlocked, binary variable equals to 1 if the country has no access to sea;
SOURCE: CEPII, www.cepii.fr/distance/geo_cepii.xls.

VARIABLE AND DESCRIPTION: GDP per capita, in current dollars;
SOURCE: World Bank, World Development Indicators 2004.

VARIABLE AND DESCRIPTION: Remoteness (country *i*):

$$R_i = \left[\sum_{k=1, k \neq i}^{N} Y_k \left(D_{ik} \right)^{1-\sigma} \right]^{1/1-\sigma}$$

k refers to all countries except *i* and D_{ik} is the distance between country *i* and country *k*, Y_k is the GDP of country *k*, σ is the elasticity and as in Carrère (2006) we use an elasticity equal to 2;
SOURCE: authors; data trade from Direction of Trade Statistics (IMF) and distance from CEPII, www.cepii.fr/francgraph/bdd/bdd.htm.

REFERENCES

Anderson, J.E., van Wincoop, E., 2003. Gravity with gravitas: A solution to the border puzzle, *The American Economic Review* 93, 170-92.

Anderson, J.E., van Wincoop, E., 2004. Trade costs, *Journal of Economic Literature* 42 (3), September, 691-752.

Anderson, J.E., Marcouiller, D., 2002. Insecurity and the pattern of trade: An empirical investigation, *Review of Economics and Statistics* 84 (2), May, 342-52.

Babestskaia-Kukharchuk, O., Maurel, M., 2004. Russia's accession to the WTO: The potential for trade increase, *Journal of Comparative Economics* 32 (4), 680-99.

Baldwin, R.E., 1989. The political economy of trade policy, *Journal of Economic Perspectives* 3 (4), 119-35.

Baldwin, R.E., 2006. The Euro's trade effects, European Central Bank, Working Papers Series n° 594, March.

Baldwin, R., Taglioni, D., 2006. Gravity for dummies and dummies for gravity equations, NBER Working Paper 12516, September.

Beck, P.J., Maher, M.W., 1986. A comparison of bribery and bidding in thin markets*, Economic Letters* 20, 1-5.

Bergstrand, J., 1989. The generalized gravity equation, monopolistic competition, and factor proportions theory in international trade, *Review of Economics and Statistics* 71, 143-53.

Bliss, H., Russet, B., 1998. Democratic trading partners: The liberal connection, 1962-1989, *The Journal of Politics* 60, 1126-47.

Carrère, C., 2006, Revisiting the effects of regional trading agreements on trade flows with proper specification of the gravity model, *European Economic Review* 50 (2), 223-47.

Cheng, I.H, Wall, H.J, 2005. Controlling for heterogeneity in gravity models of trade and integra-tion, *Federal Reserve Bank of St. Louis Review* 87 (1), January/February, 49-63.

Cheptea, A., 2007. Trade liberalization and institutional reforms, *Economics of Transition 1*, forth-coming.

De Groot, H.L.F, Linders, G.J., Rietveld, P., Subramanian, U., 2004. The Institutional Determinants of Bilateral Trade Patterns, *Kyklos* 57 (1), 103-23.

De Sousa, J., Disdier, A.-C., 2006. La qualité du cadre juridique constitue-t-elle une barrière au com-merce ? Application aux économies en transition, *Revue économique* 57 (1), 135-51.

Dutt, P., Mitra, D., 2002. Endogenous trade policy through majority voting: An empirical investiga-tion, *Journal of International Economics* 58 (1), 107-33.

Dutt, P., Traca, D.A., 2007. Corruption and bilateral trade flows: Extortion or evasion, August, available at SSRN: http://ssrn.com/abstract=992399.

Edwards, S., 1992. Trade orientation, distortions and growth in developing countries, *Journal of Development Economics* 39 (1), 31-58.

Egger, P., Pfaffermayr M., 2003. The proper panel econometric specification of the gravity equation: A three-way model with bilateral, interaction effects, *Empirical Economics* 28, 571-580.

Elbadawi, I., 2002. Real exchange rate policy and non-traditional exports in developing countries, in Helleiner, G.K. (Ed), *Non-Traditional Export Promotion in Africa: Experiences and Issu*es, Palgrave, New York.

Feenstra, R.C., 2004. *Advanced International Trade. Theory and Evidence*, Princeton, Princeton University Press.

Giavazzi, F., Tabellini, G., 2004, Economic and political liberalization, NBER Working Paper 10657, August.

Granger, C., Siroën, J.M., 2001. Les démocraties sont-elles plus ouvertes à l'échange ?, *Économie internationale* 88, 59-76.

Grossman, G., Helpman, H., 1994, Protection for sale, *The American Economic Review* 84 (4), 833-50.

Head, K., Mayer, T., 2000. Non-Europe: The magnitude and causes of market fragmentation in the EU, *Weltwirtschaftliches Archiv* 136 (2), 284-314.

Huntington, S., 1968. *Political Order in Changing Societies*, New Haven: Yale University Press.

Kubota, K., Milner, H.V., 2005. Why the move to free trade? Democracy and trade policy in the developing countries, *International Organization* 59 (1), 107-43.

Lavallée, E., 2006. Similarité institutionnelle, qualité des institutions et commerce international, *Économie internationale* 108, 27-58.

Leff, N., 1964. Economic development though bureaucratic corruption, *The American Behavioural Scientist* 8 (2), 8-14.

Levchenko, A, 2006. Institutional quality and international trade, IMF Working Paper 04/231.

Lien, D.-H., 1990. Corruption and allocation efficiency, *Journal of Development Economics* 33 (1), 153-64.

Limao, N., Venables, A., 2001. Infrastructure, geographical disadvantage, transport costs and trade, *World Bank Economic Review* 15 (3), 451-79.

Lundström, S., 2005. Decomposed effects of democracy on economic freedom, *European Journal of Political Economy* 21, 967-80.

Magee, S., Brock, W.A., Young, I., 1989. *Black Holes Tariffs and Endogeneous Policy Theory*, Cambridge, Cambridge University Press.

Mansfield, E.D., Milner, H.V., Rosendorff, P., 2000. Free to trade: Democracies, autocracies, and international trade, *American Political Science Review* 94, 305-21.

Mansfield, E., Milner, H., Rosendorff, B.P., 2002. Why do democracies cooperate more: Electoral control and international trade negotiations, *International Organization* 56 (3), 477-513.

Mauro, P., 1995. Corruption and growth, *Quarterly Journal of Economics* 110 (3), 681-712.

Mauro, P., 1998. Corruption and the composition of government expenditures, *Journal of Public Economics* 69 (2), 263-79.

Mayer, W., 1984. Endogenous tariff formation, *The American Economic Review* 74, 970-85.

Mélitz, J., 2005. North, South and distance in the gravity model, CEPR Discussion Papers 5136.

Méon, P.-G., Sekkat, K., 2005. Does corruption grease or sand the wheels of growth?, *Public Choice* 122 (1-2), 69-97.

O'Rourke, K.H., Taylor, A.M., 2006. Democracy and protectionism, NBER Working Paper 12250, May.

Olson, M., 1982. *The Rise and Decline of Nations*, New Haven and London: Yale University Press.

Rodrik, D., 1997. Democracy and economic performance, John F. Kennedy School of Government, Harvard University, December.

Rodrik, D., 2000. Participatory politics, social cooperation and economic stability, *The American Economic Review* 90 (2), papers and proceedings, May, 140-44.

Rogowski, R., 1989. *Commerce and Coalitions: How Trade Affects Domestic Political Arrangements*. Princeton: Princeton University Press.

Rosendorff, P., 2006. Do democracies trade more freely?, in Pahre, R., (Ed), *Democratic Foreign Policy Making. Problems of divided government and international cooperation,* Palgrave-Macmillan.

Santos Silva, J.M.C., Tenreyro, S., 2006, The log of gravity, *The Review of Economics and Statistics* 88 (4), November, 641-58.

Winkelmann, R., 2003. *Econometric Analysis of Count Data*, 4th ed., Berlin: Springer-Verlag.