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Article

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Does Corruption Hinder Trade for the New EU Members?

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Abstract The paper uses a gravity trade model to examine the impact of corruption on bilateral trade using a data set comprising OECD economies, new EU members and developing nations. Although the level of corruption of both the importing and exporting nations does hinder cross-border transactions, differences between their ethical standards do have a negative impact on trade flows. The model is used to assess the impact on exports and imports of Romania and Bulgaria joining the European Union.

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1 Introduction

With the planned accession of Croatia to the European Union (EU) in January 2013, it is an opportune time to assess the impact of joining the EU on bilateral trade patterns. In May 2004 eight former centrally planned economies, along with Cyprus and Malta, gained membership of the EU. The level of economic development of these Central and Eastern European countries (CEECs) was considerably lower than that of the 15 existing EU members, denoted EU(15). At the time of accession Slovenian gross domestic product per capita, the highest amongst CEECs by a significant amount, was only 52 per cent of the average level of the EU(15) and below that of Portugal, the poorest of the existing members.

There was an expectation that membership to the EU would enable the CEECs to achieve higher growth rates and greater economic development, which would reinforce their transition to a market economy and enable their standard of living to approach that of the old members. Behind such an optimistic outlook for the CEECs was the view that further trade integration with the EU(15), requiring trade liberalisation and institutional reform, would provide a positive stimulus to the various economies. During the transition process of the 1990s, a number of policies were introduced by both the CEECs and by the EU to liberalise trade but the anticipated upsurge of regional trade flows did not always materialise. One explanation could be that while international trade appears to be correlated with the economic development of a country, there is some ambiguity as to the precise direction of the causality between trade and growth. Furthermore, greater EU integration may only come about when production has reached a specific threshold, a level not achieved by all the CEECs. An additional point could be that trade integration will only lead to growth if the appropriate institutional structure is in existence. As Hall and Jones (1999) and Acemoglu et al. (2001) argue, institutions are a crucial factor in determining economic performance.

One of the problems investigating the relationship between the institutional framework and trade is that the meaning of institution is vague. Various aspects of the organisational structure of each country have been proposed as key factors affecting international trade, for example the rule of law, the legal and political system and the practice involved in doing business. A nation's institutional structure can affect the incentives of businesses and individuals to enter into contracts with foreign parties, since international transactions take place in

different legal and political jurisdictions. Any procedures designed to hinder the function of the legal system, for example a lack of full enforcement of contracts, will discourage traders from engaging in cross-border transactions as the risks associated with international trade increase, which would have an impact on the cost of exporting (Anderson and Marcouiller 2002). In this respect a poor legal framework of a partner country can be thought of having the same impact as a tariff on an imported good as it increases the price of trading across borders. If the exporter is risk neutral, the impact of a poor judicial framework will be a reduction in the volume of trade.

An opposing view is that if the administrative arrangements in a country are particularly burdensome then corruption might facilitate trade by cutting through the red tape. There is the possibility that entry into the EU might lead to a tightening up of rules and regulations in the CEECs, which might create a barrier to international transactions. As a consequence EU membership might not result in the forecast economic gains due to the increased bureaucracy and the inability to use certain practices to “oil the wheels of trade”.

In the first wave of transition economies admitted into the EU in 2004, concerns were expressed about the institutional structure present in each country and whether they could be raised to the EU standard. Romania, Bulgaria and Turkey had applied for membership with the first group of CEECs but their entry was postponed due to key considerations having not been met, some economic and some political. One of the worries about Romania and Bulgaria was the level of economic development and the degree of corruption in the countries. Although the two countries became members in January 2007, it is a commonly held view that the level of corruption had not been eradicated or reduced to that found in the EU(15) or the CEECs members. A casual observer of EU policy might interpret the entry of Romania and Bulgaria, with the associated increase in intra-EU exports, to signal that corruption does not act as a significant barrier to trade. An alternative interpretation is that membership, in particular the acceptance of the *EU acquis*, will reduce the level of corruption in the two countries, resulting in greater trade integration and economic development of the transition economies.

The focus of this paper is to investigate whether corruption plays an important role in bilateral trade. Following a number of studies, the gravity trade model is employed to examine the volume of trade between two countries. The basic model is modified by the inclusion of the corruption perception index (*CPI*) to capture

the potential distrust of a trading partner, which can be considered as a barrier to trade. Such an approach enables us to assess the potential impact when the two countries enter the European Union in 2007.

The structure of the paper is as follows. Section 2 provides a brief survey of the role that corruption may play in international trade. Section 3 considers the model specification and the description of the data. Section 4 presents the related econometric issues and the estimated results accompanied by their corresponding economic interpretation. The policy implications are discussed in Section 5 and Section 6 concludes the analysis.

2 Corruption: Does It Hinder International Trade?

“Perversion or destruction of integrity in the discharge of public duties by bribery or favour; the use or existence of corrupt practices, esp. in a state, public corporation, etc.” (Oxford English Dictionary).

While corruption can be thought of as being anything that goes against the legal system or viewed as inappropriate business practices in an advanced country, it is rather difficult to define the term precisely as it depends upon the country’s norms or conventions. The effects of corruption, or perceptions of corruption, in a country can be wide reaching and will permeate deep into the organisational arrangements, for example the legal system, and the general business ethical standards of a nation, such as the acceptability of bribes. Hence, one way of identifying the degree of corruption in a country is via the structures and institutions present in the economy. The institutional framework of a country can be thought of as a general term describing the formal and informal ways of undertaking transactions within a jurisdiction. It captures the business practices within the location, the sanctions that can be imposed if the rules are violated and the bodies established to enforce those norms (Chepeta 2007).

There exists a large literature on the influence of the institutional framework on economic activity, ranging from Mauro (1995) and Knack and Keefer (1995) who look at total investment to Wei (2000) on foreign direct investment. The general consensus is that a poor institutional structure, captured by the rule of law and bureaucratic corruption, has a negative impact on economic growth and leads

to a lower level of development (Rodrik et al. 2004). Empirical studies on the influence of corruption on economic performance display mixed findings. While it is commonly perceived that corruption will adversely affect the standard of living of a country, a number of cross-country studies have found a positive impact (see inter alia Meon and Weill 2008, Aidt et al. 2008, Mendez and Sepulveda 2006 and Egger and Winner 2005).

With the exception of de Jong and Bogmans (2011), little attention has been given to the influence of institutions on trade, restricting the potential benefits from membership of a RTA. While Rodrik (2000) highlighted the relationship between the institutional and governance structure and trade reform, his focus was more on how the removal of protectionist measures encouraged institutional reform, leading to a higher level of economic development. This strand of the literature emphasised causality in one direction, with an improved institutional structure being brought about by trade reforms.

When looking at the impact of enlargement of the EU, the analysis is in the other direction and considers that corruption might act as a barrier on bilateral trade. The pro-trade effect of institutions is still in its infancy (see inter alia Anderson and Marcouiller 2002, de Groot et al. 2004 and Meon and Sekkat 2007). Such a direct relationship on exports may work through formal routes but may also include informal mechanisms. The primary impact of institutions on international trade is via the expected rate of return compared to domestic transactions. The existence of foreign establishments of low quality, be them public or private, will act as a tax on international trade. Equally, good organisational structures in a nation stop corrupt practices and so foster trade.

In countries where government regulations are pervasive, there will be a tendency for protectionist trade policies to exist, requiring import licences for foreign produced goods to enter the country. Such a situation would encourage rent-seeking activities by agents in the form of bribery and corruption (Krueger 1974). The more restrictive the trade policies the greater the incentives to engage in corrupt activities, with larger bribes paid to bureaucrats. As a consequence, there should be a negative relationship between bilateral trade and corruption.

These factors should not be viewed as being independent. An over-zealous bureaucracy will restrict the functioning of the legal system as well as reducing the volume of imports. The combination of regulations in both sectors creates an incentive to increase bribes to officials to facilitate the business transaction.

Hence, there is likely to be a positive relationship between the degree of corruption and the volume of international transactions.

A nation's business culture could be a deterrent to international trade and it may be that similarities of ethical standards between countries are an important issue. An international transaction will take place if both the buyer and seller believe the side payment to a government official, or a personal kickback, is perfectly acceptable. Alternatively, if either party comes from a country where backhanders are not the norm then there is a cultural barrier stopping the exchange of goods and services. Consequently, it may be the difference between the levels of corruption in the two economies that discourages bilateral trade between the countries.

An indirect effect, magnifying the above argument, is the loss of reputation that a firm, based in country with high ethical standards, might face when found trading with a corrupt country. The bad publicity from the exposure might be damaging in other export markets and even domestic consumers might turn away from the company's products. Hence, there will be the tendency for like-minded firms to undertake international transactions, even though there might be profitable export possibilities elsewhere. Guilt by association, which comes with having trade relationships with an international pariah, will have a negative effect on trade flows with third parties.

Two other indirect influences have been cited in the literature. Firstly, the institutional framework is important for investment as corruption will deter new projects being undertaken. This is due partly to an increase in the cost of capital caused by the sweeteners that have to be paid to establish the venture. Equally, the uncertainty emanating from corruption will reduce the level of foreign direct investment and result in lower gross capital formation in a country. There is evidence that investment has been found to be a determinant of exports, Rodrik (1995). Hence, a high level of corruption will impact on investment and reduce trade.

The second indirect influence that the business environment has on trade is via productivity, with low levels of output per worker being associated with low quality institutions (Hall and Jones 1999 and Doyle and Martinez-Zarzoso 2011). Along with the exchange rate and unit labour costs, labour productivity is one of the determinants of competitiveness. Low labour productivity will result in low competitiveness, which leads to a low level of international trade.

The above discussion has highlighted a number of ways how the quality of the institutions in a country might determine the volume of trade. However, it must be acknowledged that the causality between openness and organisational structure of countries might run in the opposite direction, with trade affecting the legal system and democracy, or be bidirectional, (Dollar and Kraay 2003). As a consequence, the empirical work will have to recognise the potential endogeneity issues and care will be needed when interpreting the estimated parameters.

There is not an unambiguous measure of corruption in an economy and a number exist in the literature, for example the International Country Risk Guide, the index for Economic Freedom by the Heritage Foundation and Cost of Doing Business from the World Bank. Each index has its relative strengths and weaknesses, Bardhan (2005). As the economic structures of the new EU entrants have undergone significant changes over the last 20 years, the index should have a relatively long time dimension and a wide coverage of countries. Consequently, the Corruption Perception Index, compiled by Transparency International, has been adopted in a number of the empirical studies and tends to relate to public-sector activities, which will then influence the standards of the private sector. The range of the index goes from 0, a high perception of corruption, to 10, a very low level of corruption.

An overview of scores according to the Corruption Perception Index for the existing EU members and the new entrants is provided in Table 1, presenting the means for 1996-2008 along with the values in 1998 and 2007. Out of the old members, the ranking of the Scandinavian countries is highest, indicating a low perception of corruption. Although making comparisons over time is fraught with difficulties, the index for Belgium, France, Italy and Spain shows an improvement over time. The relationship between the corruption perception index and bilateral trade is not obvious from casual observation.

As expected, on average the existing members of the EU are perceived to be less corrupt than the new entrants. However, Italy and Greece are ranked below Cyprus, Estonia, Hungary, Malta and Slovenia. There is a substantial difference between the scores of the latest new entrants, Bulgaria and Romania, and those from the first wave, with only Latvia having an average below 4. With the exception of Poland, all the transition economies had higher perceived levels of corruption in 1998 compared to 2007, which would be consistent with EU membership resulting in an improved institutional framework in these economies.

Table 1: Corruption Perception Index for EU members

	Average				Average		
	1996-2008	1998	2007	<i>New entrants</i>	1996-2008	1998	2007
Austria	7.96	7.5	8.1	Bulgaria	3.75	2.9	4.1
Belgium	6.68	5.4	7.1	Cyprus	5.75	6.1	5.3
Denmark	9.60	10	9.4	Czech Republic	4.57	4.8	5.2
Finland	9.58	9.6	9.4	Estonia	6.00	5.7	6.5
France	6.90	6.7	7.3	Hungary	5.06	5.7	6.5
Germany	7.58	7.9	7.8	Latvia	3.92	3.8	4.8
Greece	4.56	4.9	4.6	Lithuania	4.58	3.8	4.8
Ireland	7.63	8.2	7.5	Malta	6.28	5.8	6.8
Italy	4.85	4.6	5.2	Poland	4.32	4.6	4.2
Netherlands	8.86	9	9	Romania	3.10	3	3.7
Portugal	6.46	6.5	6.5	Slovak Republic	4.10	3.9	4.9
Spain	6.54	6.1	6.7	Slovenia	6.04	6	6.6
Sweden	9.27	9.5	9.3				
United Kingdom	8.48	8.7	8.4				

In the last fifteen years researchers have also been concerned with the use of gravity models in empirical studies looking at the process of economic integration and the role that RTAs have played in encouraging trade among members. There exists a large body of work examining the main changes in the geographical pattern of trade and analyzing the effects of regional trade arrangements (RTA) and free trade agreements (FTA) as well as currency unions on trade flows (see inter alia, Gros and Gonciarz 1996, Baldwin et al. 1997, Brenton and Di Mauro 1999, Frankel and Rose 2000, Nilsson 2000, Laaser and Schrader 2002, Brenton and Manzocchi 2002, Damijan and Masten 2002, De Benedictis et al. 2005, Bussiere et al. 2008 and Hornok 2010). The majority of these studies find that the RTAs created to prepare transition countries for EU accession, have generated considerable growth intra EU-CEECs trade flows, with the coefficients of regional dummies being positive and statistically significant.

Damijan and Masten (2002) use both static and dynamic model specifications in a panel framework to explore the efficiency of free trade agreements. The impact is not instantaneously achieved but instead it takes time for the effects of trade liberalization to have an influence on trade. The rapid expansion of Slovenian imports from other CEECs members of the Central European Free Trade Area (CEFTA) between 1993 and 1998 is used as the example. Furthermore, tariff reductions become effective in the second to third year after enforcement of the FTA. The analysis revealed that CEFTA members had increased export volumes to Slovenia than other non-CEFTA members (approximately 18.8% higher).

Laaser and Schrader (2002) use a gravity model whose estimates suggest the level of regional integration for the Baltic States is higher than normally observed in the case of other countries. Distance is extremely important for the Baltic States in shaping their regional trade pattern, with the coefficient being close to -1 in all cases. However, the process of European integration runs primarily via Baltic countries' neighbours and the transport system dominates the trade regime by shaping trade flows in the region.

The effect of regional trading arrangements on trade patterns in the enlarged EU has been investigated by De Benedictis et al. (2005), who focus on whether and how the EU Free Trade Agreements (FTAs) with the CEECs exerted a different impact on centre-periphery and intra-periphery trade relations. Using a data set comprising bilateral trade flows between eight CEECs and EU countries, a gravity equation is estimated using a system GMM dynamic panel data approach. The results support the hypothesis that distance matters. As far as the effect of free trade agreements is concerned, evidence is found that FTAs between EU and the CEECs, as well as among the CEECs, have a positive impact on trade flows.

The gravity trade model is equally well suited to consider an *ex-post* assessment of the trade effects of a country becoming a member of a RTA and has been used by a number of researchers for this purpose (see inter alia Aitken 1973, Soloaga and Winters 2001, Carrere 2006). Dummy variables are employed to capture the "atypical" trade due to the RTA. Following a Vinerian approach, dummies should be introduced for each RTA to capture three different effects. Firstly, pure trade creation is defined as an increase in intra-regional trade flows with imports from the rest of the world remaining constant. Secondly, pure trade diversion is when the increase in intra-regional trade is at the expense of the rest

of world. Finally, the possibility should be considered that membership of an RTA could lead to an increase in exports from members to non-members.

There was a fundamental change in the foreign trade regimes of the Central and East European countries (CEECs) after 1989. Firstly, following the collapse of the Council for Mutual Economic Assistance (CMEA) and the Soviet Union, as well as through trade liberalization with the West, the CEECs' trade was reoriented from East to West. The results provided by our gravity model should shed light on these changes. Secondly, there have been a number of new economic integration agreements, which have been established among the countries in the data set since 1992 and it is important to take into account how these new RTAs have influenced trade flows. Thirdly, the CEECs have been changing rapidly in recent years and hence there is a need to estimate the relationship over a number of years to see whether the parameters remain constant over time.

The main regional trading agreements amongst the countries in the dataset and the list of members are presented in Table 2. The total volume of trade of the countries listed makes up over 70 per cent of world trade. With the Baltic Free Trade Area and the Central European Free Trade Agreements, some of the CEECs had the experience of being in an RTA before joining the European Union in 2004 and 2007 respectively.

For countries in the Baltic Free Trade Agreement and the Central European Free Trade Agreement, when the nations joined the European Union they gave up membership of their previous RTA. As of May 1st, 2007 the CEFTA member countries are the following: Albania, Bosnia and Herzegovina, Macedonia, Moldova, Montenegro, Serbia and the United Nations Interim Administration Mission (UNMIK) on behalf of Kosovo.

It is an empirical issue as to whether membership of one of the above RTAs has had a positive influence on bilateral trade. The GTM will include a dummy variable beginning from the year of a country's accession to the RTA and ending when the membership ceased. It is envisaged that such an approach will shed some light on quantifying the effect on bilateral trade of Bulgaria and Romania joining the EU compared to improving their business standards. It is acknowledged that these two factors are not independent and it is an issue discussed in the next section.

Table 2: Regional trading agreements of countries in the dataset

Abbreviation	Title	Members	Year
<i>EU</i>	European Union	Austria (1995), Belgium, Denmark (1973), Finland (1995), France, Germany, Greece (1981), Ireland (1973), Italy, Luxembourg, Netherlands, Portugal (1986), Spain (1986), Sweden (1995), United Kingdom (1973). <i>2004 Entrants:</i> Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia, Slovak Republic <i>2007 Entrants:</i> Bulgaria, Romania	1957
<i>CAN</i>	Andean Community	Bolivia, Colombia*, Ecuador*, Peru, Venezuela*	1993
<i>BAFTA</i>	Baltic Free Trade Area	Estonia, Latvia, Lithuania	1994
<i>CEFTA</i>	Central European Free Trade Agreement	Poland (1992), Hungary (1992), Czech Republic (1993), Slovakia (1993), Slovenia (1996), Bulgaria (1997), Romania (1999), Croatia (2003), Macedonia (2006), Albania (2007), Bosnia and Herzegovina (2007), Croatia (2007), Macedonia (2007), Moldova (2007), Montenegro (2007), Serbia (2007) and Kosovo (2007)	1992
<i>CER</i>	Closer Trade Relations Trade Agreement	Australia, New Zealand	1989
<i>MERCOSUR</i>	Southern Common Market	Argentina, Brazil, Paraguay*, Uruguay*,	1991
<i>NAFTA</i>	North American Free Trade Agreement	Canada, Mexico, United States	1994
<i>GCC</i>	Gulf Cooperation Council	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates	1981

*Excluded from the data set.

3 Model Specification and Data Description

Given that the majority of empirical studies into trade and the institutional framework use the gravity trade model (GTM), we follow their approach, which enables comparisons to be made with other work in the literature. In general terms the GTM expresses the bilateral trade flow as being determined by the supply conditions in the source country and the demand conditions in the host country. The basic GTM can be expressed algebraically as follows:

$$X_{ij} = AY_i^{\beta_1} Y_j^{\beta_2} Pop_i^{\beta_3} Pop_j^{\beta_4} Dist_{ij}^{\beta_5} F_{ij}^{\beta_6} \varepsilon_{ij} \quad (1)$$

where X_{ij} is the current value of exports to country i from country j , Pop_i and Pop_j are the populations of i and j , Y_i and Y_j are their respective incomes, $Dist_{ij}$ represents the distance between the two countries' capital cities, F_{ij} counts for any other factor helping or preventing trade between pairs of countries, and ε_{ij} represents the error term.

The empirical analysis in this paper uses data on the volume of trade taken from the IMF Direction of Trade Statistics. The countries included in the data set are given in Appendix 1 and data source in Appendix 2. Table 3 presents the descriptive statistics for the data set. For estimation purposes we specify an augmented version of Equation (1) in log-linear form which is given by:

$$\begin{aligned} \ln X_{ij} = & \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln(Y / Pop)_i \\ & + \beta_4 \ln(Y / Pop)_j + \beta_5 \ln Dist_{ij} + \beta_6 Contig_{ij} \\ & + \beta_7 Comlang_off_{ij} + \beta_8 Colony_{ij} + \beta_9 Corr_i \\ & + \beta_{10} Corr_j + \alpha_1 EU_{ij} + \alpha_2 CAN_{ij} + \alpha_3 BAFTA_{ij} \\ & + \alpha_4 CEFTA_{ij} + \alpha_5 CER_{ij} + \alpha_6 MERCOSUR_{ij} \\ & + \alpha_7 NAFTA_{ij} + \alpha_8 GCC_{ij} + \varepsilon_{ij} \end{aligned} \quad (2)$$

The economic sizes of exporting and importing countries are captured by GDP, providing measures of supply capabilities and demand potential. Output can be modified by the ratio of its production for export to total production, referred to as the openness ratio, and it shows a tendency to vary negatively with population. The physical size and, therefore, self-sufficiency of the economy is captured by the population variable. Country i 's demand for imports depends on its income and

the size of the economy for which population is a proxy. For the importer, GDP is a measure of income. Population is included to reflect that larger, more populous countries tend to be more self-sufficient and, therefore, engage less actively in trade. The model assumes that the price importers face for any given variety of exported good rises with the cost of doing business internationally, and this is broadly measured by distance.

The model is modified by the inclusion of dummy variables that impact on the cost of doing business (see inter alia Wang and Winters 1994, Laaser and Schrader 2002 and Anderson and Wincoop 2003). If country i and country j have a common border then it is likely that greater trade will take place between these two economies on account of the cross-border trading, Contig $_{ij}$. The use of dummy variables can be criticised as it implicitly assumes that the incentive for neighbouring states to trade is independent of the location and the size of the border.

Language is an important determinant of the volume of trade. In an attempt to capture this effect the dummy variable Comlang_off takes a value 1 if country i and nation j have a common official language and zero otherwise. The variable proxies the language cost of the international transaction, especially the business negotiations.

As export performance will be determined by business contacts and networks, a common history can be a key factor in trade flows. It will tend to reduce the cost of establishing an export infrastructure, for example the distribution network and

Table 3: Descriptive statistics

	Mean	Standard deviation
X_{ij}	1131.06	7323.94
$Corr_i$	5.24	2.38
Y_i	482.43	1400.24
Y_i/Pop	13.06	1.41
$Dist_{ij}$	5431.66	4651.46
$Colony$	0.02	0.16
$Comlang_off$	0.06	0.23
$Contig$	0.04	0.20

after-sales service, as personal contacts are more likely to exist and there is more likely to be a general understanding of the market requirement. Furthermore, a common history may lead the population to prefer exports from a former colony over exports from other destinations, assuming that the experience was not negative. Whether a country had been a colony is captured by the dummy variable *Colony*, which takes the value 1 if it has been a colony of country j and zero otherwise.

The gravity trade model is modified to include the corruption perception index of the importing country and exporting partner, $Corr_i$ and $Corr_j$ respectively. These two variables capture the institutional and governance structures of countries and, given the measurement of the index, the estimated coefficients are expected to be positive.

A number of studies exist examining the relationship between corruption and trade. The research has tended to focus on the impact of protectionist policies on measures of the evasion of public sector red tape (see inter alia Bandyopadhyay and Roy 2007, Dutt 2009 and Mishra et al. 2008). Using aggregate and disaggregated data, the general finding is of a significant and robust impact of trade barriers on corruption. The policy recommendation emanating from such studies is that liberalisation of trade practices in an economy would reduce the level of bureaucratic corruption in its jurisdiction.

Although not common practice, certain studies have estimated a corruption-augmented GTM. Dutt and Traca (2010) used bilateral trade data over the sample period 1982 and 2000, covering 128 exporters and 126 importers, and found that the effect of corruption is ambiguous and depends upon the level of trade protection in the economy. While corruption generally hinders trade, a positive relationship appears as the government-erected barriers to trade rise. Our research is more focused on the EU, using data from the 2000s, and investigates the impact of accession to the RTA on Bulgarian and Romanian trade.

4 Econometric Issues and Empirical Results

There was an initial reservation about estimating the model within a pooled framework as Transparency International make it clear that there is no consistency with the measurement scheme of the corruption perception index over time. However,

it is possible that time dummies might be able to capture any time differences in scales of the corruption scores. After estimating the augmented GTM on a year-by-year basis it was decided to pool the data and estimate Equation 2 using panel technique as the homogeneity of coefficients could not be rejected.

A number of econometric issues have been raised in relation to the estimation of the GTM. Certain authors have proposed a correction of the coefficients' standard error as a result of the clustering of observations due to country specific effects (Baier and Bergstrand 2009, de Jong and Bogmans 2011). Although this could have been used as a sensitivity test for the results, it was not used when estimating the models below. Egger and Pfaffermayr (2005) showed that country pair fixed effects should be employed to obtain efficient estimators of a GTM in a panel framework. Although a number of studies have adopted this method, there are some problems associated with this approach in the context of the current research question. Firstly, for the majority of countries in the data set there is no significant variation in the corruption perception index over time. Consequently, a relatively high correlation was found between the measures of the perceived level of corruption, including the various transformations considered, and the fixed pair dummy variables. To enable the research to consider the proposition that countries with similar levels of corruption tend to trade more, even after controlling for RTAs, we decided to adopt the approach of only country fixed effects.

Of more concern is the possibility of the simultaneous determination of exports and the perceived corruption. A country with a high propensity to export will have greater contact with the rest of the world, which will affect its perceived level of corruption by the other countries. Equally, an outward-looking population, with a low level of corruption, may tend to be more active in world politics and this could lead to a higher level of international trade. Rather than adopting the Hausman-Taylor approach favoured by Egger and Winner (2005), instrumental variable estimation is employed to deal with the simultaneity problem.

The results from estimating the GTM on the full data using OLS are Equation 1 in Table 4, along with heteroscedasticity-consistent standard errors. The estimated coefficients are consistent with economic intuition concerning sign and magnitude. The income elasticity of the importer is close to unity and below that of the exporter, although both are highly significant. The size of the population, via the inclusion of per capita terms, is to capture the physical size and therefore self-sufficiency of the two economies. The coefficients are negative and

statistically significant from zero. When the equation is reparameterised to give the logarithm of the income of the two countries and their relative populations, the income elasticities of both importer and exporter are approximately equal to 0.8. The estimated coefficient on distance is slightly greater in magnitude than -1, indicating that a doubling of distance leads to more than a halving of trade.

Table 4: The augmented Gravity Trade Model

Estimation	Eq 1		Eq 2		Eq 3	
	OLS		IV		IV	
	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.
C	19.336	0.154	18.298	0.340	18.741	0.364
<i>Corr_i</i>	0.038	0.007	0.056	0.026	0.083	0.028
<i>Corr_j</i>	0.180	0.007	0.051	0.020	0.039	0.022
ln(<i>Y_i</i>)	0.989	0.006	0.987	0.006	0.995	0.006
ln(<i>Y_j</i>)	1.198	0.006	1.190	0.006	1.202	0.006
ln(<i>Y/Pop_i</i>)	-0.130	0.013	-0.156	0.041	-0.207	0.043
ln(<i>Y/Pop_j</i>)	-0.349	0.013	-0.152	0.032	-0.149	0.034
ln(<i>Dist_{ij}</i>)	-1.093	0.010	-1.076	0.011	-1.101	0.012
<i>Colony</i>	0.373	0.053	0.366	0.053	0.381	0.057
<i>Comlang</i>	0.764	0.040	0.814	0.042	0.830	0.045
<i>Contig</i>	0.835	0.046	0.827	0.046	0.851	0.049
<i>BAFTA</i>	3.226	0.227	3.230	0.228	3.180	0.233
<i>CAN</i>	1.006	0.380	0.998	0.382	0.925	0.390
<i>CEFTA</i>	0.545	0.226	0.487	0.227	0.447	0.232
<i>EU</i>	0.300	0.026	0.315	0.027	0.343	0.028
<i>MED</i>	0.231	0.111	0.247	0.112	0.204	0.116
<i>GCC</i>	0.432	0.145	0.264	0.154	0.256	0.158
<i>MERCOSUR</i>	0.549	0.487	0.522	0.492	0.597	0.549
<i>NAFTA</i>	-0.387	0.201	-0.378	0.202	-0.461	0.225
Obs	40042		40042		37504	
<i>R</i> ²	0.739		0.737		0.729	
Time dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	

The coefficients on the perception of corruption are both positive and statistically significant at a 1% level. In Equation 1 the influence of the corruption level of the exporter is more important for the flow of goods and services between the two countries than that of the importer. For instance the impact of corruption on bilateral trade from the UK to Romania is higher than the trade from Romania to the UK.

The effects of a common border, a common official language and being a colony on bilateral trade are correctly signed and of a plausible size. For the new entrants into the EU, policies could not really be introduced to increase the exports to members, assuming they were not prepared to change their official language. However, it does indicate the importance of a common language as a facilitator of trade.

The coefficients on the various RTA dummies provide some information of their influence on bilateral trade. Membership of the Andean Community, Baltic Free-Trade Area, the Central European Free Trade Agreement, the Southern Common Market and Gulf Cooperation Council had a positive impact on intra-RTA bilateral trade. Only for NATFA is the effect negative.

Concern has been expressed in the literature about the endogeneity of the corruption perception index as it will tend to be influenced by the amount of trade with a country, for example exposure to fraudulent business practices are more likely to come to light the more two countries trade. Building on the work of Helpman et al. (2008) and Dutt and Traca (2010), we use a common religion index and a measure of remoteness as instruments, along with lagged values, in an attempt to overcome this problem. The estimated coefficients are reported in column 2 of Table 4. There are few changes to the estimated elasticities of the traditional gravity model, with only the halving of the coefficient on exporter per capita income to note. However, the estimated parameters on the corruption perception index are changed, being reduced for the importer and increased for the exporter, which can partially be explained by the two variables being endogenous. The effect of corruption on bilateral trade is statistically significant for both parties. The only other coefficient to change is that on the GCC dummy, which decreased in size and is no longer significant at the 5 per cent level.

For our selection of countries, the coverage of the corruption perception index increases greatly after 1999. As a consequence the augmented gravity trade model was re-estimated for a shorter sample period and the IV estimates are Equation 3

in Table 4. Only changes in two coefficients are worthy of note. Firstly, the parameter on importers corruption increases by more than half and that for the exporter is reduced, becoming statistically insignificant. Secondly, the effect of the GCC dummy reduced in magnitude, suggesting that the benefits from the RTA tended to be at the start of the sample period.

While there is some evidence of the effects of corruption on bilateral trade, the failure to find a strong impact may be due to the influence not being monotonic. Consequently, the simple functional form of our gravity trade model is not appropriate for the forces that hinder trade. It may be that two countries with high business standards will tend to trade more with each other than that predicted by the basic model. To capture this effect, the product of the corruption perception index is included as an additional variable, with the estimated coefficients given in Equation 4 in Table 5. Surprisingly, the effect is negative which suggests that, conditional on other variables, countries with high measures of CPI tend to trade less with each other than countries with lower ethical standards. Such a finding indicates that cleaning up business practices too much may hinder bilateral trade.

One of the criticisms of the functional form of Equation 4 is that too little weight is given to the economic relationships between the more corrupt economies. It is possible that like-minded economies are attracted when it comes to international trade as a firm feels that it can do business in an environment that it is familiar with. If there is a culture of bribes in the economies of both parties then it is easier to accept them as part of business rather than finding such practices abhorrent. Equation 5 proxies the idea of similar economies attracting more trade by including the absolute value of the difference of the corruption perception indices as an explanatory variable. The coefficient on $|Corr_i - Corr_j|$ is negative while the coefficients on the individual measures of corruption are positive, although that for the importer is not statistically significant. The inclusion of the variable leads to two other changes of note; the coefficients on importer per capita income and the NAFTA dummy decrease in magnitude. According to R^2 , the equation appears to fit better than the other models. The final transformation of the corruption variable includes the square of the difference between the corruption indices of the two nations. However, this version is not as successful as the coefficient on the corruption of the importer is negative, although insignificant.

Table 5: The augmented gravity trade model with non-linear corruption

Estimation	Eq 4		Eq 5		Eq 6	
	IV		IV		IV	
	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.
C	18.612	0.372	18.092	0.351	17.595	0.361
$Corr_i * Corr_j$	-0.018	0.009				
$ Corr_i - Corr_j $			-0.066	0.030		
$(Corr_i - Corr_j)^2$					-0.034	0.005
$Corr_i$	0.214	0.078	0.058	0.029	-0.038	0.030
$Corr_j$	0.169	0.059	0.071	0.022	0.118	0.023
$\ln(Y_i)$	0.991	0.006	0.984	0.006	0.977	0.006
$\ln(Y_j)$	1.194	0.006	1.187	0.006	1.181	0.006
$\ln(Y/Pop_i)$	-0.250	0.060	-0.099	0.048	0.022	0.050
$\ln(Y/Pop_j)$	-0.186	0.036	-0.166	0.033	-0.211	0.034
$\ln(Dist_{ij})$	-1.095	0.014	-1.065	0.012	-1.040	0.013
<i>Colony</i>	0.381	0.054	0.363	0.053	0.351	0.054
<i>Comlang</i>	0.813	0.043	0.780	0.045	0.697	0.047
<i>Contig</i>	0.877	0.052	0.780	0.050	0.700	0.050
<i>BAFTA</i>	3.179	0.232	3.210	0.228	3.141	0.231
<i>CAN</i>	0.992	0.385	1.031	0.380	1.034	0.386
<i>CEFTA</i>	0.564	0.232	0.392	0.230	0.251	0.233
<i>EU</i>	0.319	0.027	0.284	0.030	0.198	0.033
<i>MED</i>	0.243	0.113	0.184	0.115	0.063	0.117
<i>GCC</i>	0.332	0.158	0.182	0.158	0.039	0.159
<i>MERCOSUR</i>	0.655	0.500	0.416	0.492	0.194	0.500
<i>NAFTA</i>	-0.438	0.206	-0.293	0.205	-0.130	0.208
Obs	40042		40042		40042	
R^2	0.732		0.739		0.731	
Time dummies	Yes		Yes		Yes	
Country dummies	Yes		Yes		Yes	

5 Policy Implications

According to the estimated modified GTM, corruption tends to hinder trade, although the difference between the ethical standard of the importing and exporting country has a negative impact on international transactions. This creates a dilemma regarding policy implications and the potential positive effects relating to the EU membership for Bulgaria and Romania. While the estimated coefficients could be used to predict trade in the post-entry years and comparing the figures to actual imports and exports, it was decided to consider the implications of improving the perceived corruption for both Bulgaria and Romania. This approach was taken as it avoids the problems created by the 2008 global financial crisis and its impact on international trade.

As can be seen from Tables 6 and 7, the sources of imports and the destinations of exports vary between the two 2007 entrants into the EU, with greater concentration appearing in Romanian trade. In the top 10 sources of imports into Bulgaria, a quarter came from the Russian Federation, Ukraine and Turkey, non-EU countries and are from countries which have been identified as displaying a tendency for corrupt practices. In comparison, the combination of imports from non-EU countries into Romania came to 10 per cent lower, at 15 per cent. As a consequence any improvement in business practices, which may accompany EU membership, would affect Bulgarian imports to a greater extent.

Of more interest is the impact on exports from joining the EU as it is believed that an increase in trade from the transition economies would be generated. The main destinations of Bulgarian goods differ from that of Romanian products. Turkey is the main destination for the former country and the total non-EU destination comes to just under 14 per cent. For Romania the only non-EU country in the top 10 destinations is Turkey at 7 per cent.

Given the role that corruption plays on trade, one interesting exercise to examine is what would happen if the two 2007 entrants saw an improvement in their corruption perception index, either through the implementation of policies or by association of EU membership. One possibility is for the index to increase by 0.2 for both countries, which is equivalent to an average increase experienced by the first wave of transition economies a year after EU membership. For Bulgaria such a change would lead to a 14.2 per cent increase in imports and a rise of 19.5 per cent in exports. The effects for Romania would be even greater, 19.5 per cent

for imports and 27.4 per cent in exports, which is of a similar magnitude to the direct effect of EU membership.

Table 6: Top 10 sources of imports into Bulgaria and Romania, with the associate corruption perception index in parentheses

Bulgaria	Share (%)	Romania	Share (%)
Russian Fed. (2.3)	12.4	Germany (7.8)	17.2
Germany (7.8)	12.3	Italy (5.2)	12.8
Italy (5.2)	8.7	Hungary (5.3)	6.9
Ukraine (2.7)	7.2	France (7.3)	6.4
Turkey (4.1)	6.8	Russian Fed. (2.3)	6.3
Greece (4.6)	6.2	Turkey (4.1)	5.4
Romania (3.7)	4.5	Austria (8.1)	4.8
Austria (8.1)	4.3	Netherlands (9.0)	3.6
France (7.3)	3.4	Poland (4.2)	3.4
Hungary (5.3)	3.1	China (3.5)	3.3

Table 7: Top 10 destination of exports from Bulgaria and Romania, with the associate corruption perception index in parentheses

Bulgarian exports	Share (%)	Romanian exports	Share (%)
Turkey (4.1)	11.4	Italy (5.2)	17.1
Italy (5.2)	10.3	Germany (7.8)	16.9
Germany (7.8)	10.2	France (7.3)	7.7
Greece (4.6)	9.1	Turkey (4.1)	7.0
Belgium (7.1)	6.1	Hungary (5.3)	5.7
Romania (3.7)	4.9	UK (8.4)	4.1
France (7.3)	4.0	Bulgaria (4.1)	3.2
UK (8.4)	2.5	Austria (8.1)	2.6
Russian Fed. (2.3)	2.4	Spain (6.7)	2.3
Spain (6.7)	2.4	Poland (4.2)	2.2

The relationship between the corruption perception index and the membership of a trade bloc is a complex one, with membership not always leading to an increase in perceived ethical standards. Increased exposure to a trading partner and their ways of doing business may lead to a reduction in the CPI for the country. In the case of the 2007 expansion of the EU, Bulgaria saw a significant decline in its score in 2008 and the business environment was marked below that of Romania, whose index increased by 0.1.

6 Conclusion

The main focus of the current study is to investigate the role of corruption in bilateral trade and to see whether it hinders international transactions or whether it encourages cross-border trade. Using the gravity trade model, the estimated coefficients suggest that Transparency International's corruption perception index has a positive impact on international business. The general finding is that sleaze tends to have a negative impact on bilateral trade and in the preferred equation it is more important for the importer than for the exporter, although both are statistically significant. These results indicate that corruption does hinder trade within the European Union, even though the rules and regulations can be considered to be too bureaucratic. However, one must take into account the business cultures of both parties as the absolute difference between their measured levels of corruption has a negative influence on trade flows. Countries with a similar ethical business environment will tend to trade more with each other, suggesting that a shared understanding of what is an acceptable practice is an important factor in cross-border transactions.

Adopting approaches in business that avoid backhanders and other trade sweeteners may end up costing firms lost contracts. It depends upon the trading framework of the other party to the transaction. This finding suggests that the impact of the entry of Romania and Bulgaria into the EU will not be a panacea to their trade problems. Looking at the sources of imports and the destinations of exports for the 2007 entrants showed that a small improvement in corruption would outweigh any of the direct benefits from joining the EU. The corruption perception index for Bulgaria in 2011, four years after becoming a member of the EU, was standing at only 3.3 and below that of the year of accession. As a

consequence any gains from membership have been eroded by the bad business practices considered as acceptable in Bulgaria.

The lessons for Croatia, which has a corruption perception score of 4.0, are that the government should implement policies that eradicate bribery and punish individuals and businesses that are found to bend the rules. If such policies are successfully introduced then EU membership will have a positive impact on Croatia, with an increase in trade flows. A failure to recognise the role of corruption and the importance of the business environment will mean that any benefits will be greatly reduced.

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Appendix 1: Countries in the Data Set

The data set comprises:

Albania, Argentina, Australia, Austria, Azerbaijan, Bahrain, Belarus, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, China, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, India, Ireland, Italy, Japan, Jordan, Kazakhstan, Korea, Kuwait, Latvia, Lebanon, Lithuania, Macedonia, Malta, Mexico, Moldova, Morocco, Netherlands, New Zealand, Norway, Oman, Peru, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Serbia and Montenegro, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, United Arab Emirates, United Kingdom, United States, Uzbekistan, Vietnam.

Appendix 2: Sources and Definition of Data

Variable	Definition	Source
T_{ij}	Trade flows between capital of country i and country j	IMF DoT
Y_i	Gross domestic product of the importing country	IMF FS
Y_j	Gross domestic product of the exporting country	IMF FS
Y_i/Pop_i	Per capita gross domestic product of the importing country	IMF FS
Y_j/Pop_j	Per capita gross domestic product of the importing country	IMF FS
$Dist_{ij}$	Distance between the capital of country i and country j	CEPII
EU	Dummy variable for membership of the European Union	
CAN	Andean Community	
$BAFTA$	Baltic Free Trade Area	
$CEFTA$	Central European Free Trade Area	
CER	Closer Trade Relations Trade Agreement	
$MERCOSUR$	Southern Common Market	
$NAFTA$	North American Free Trade Area	
GCC	Gulf Cooperation Council	
$Contig$	Country i and j have a common border	
$Comlang_off$	Country i and j have a common official language	
$Colony$	Country i is a colony of country j	
$Corr_i$	Corruption Perception index of the importer	TI
$Corr_j$	Corruption Perception index of the exporter	TI

IMF DoT IMF Direction of Trade Statistics

IMF FSIMF Financial Statistics

CEPII Centre d'Etudes Prospectives et d'Informations Internationales

TI Transparency International

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