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The Impact of Culture, Institutions, and the Euro on Trade Flows in Europe

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Abstract
This paper sets out to study the role of cultural and institutional differences across European countries in explaining patterns of bilateral trade within Europe by using a gravity model approach on panel data for 24 European countries, covering the years 2002 through 2006. It may be expected that cultural and institutional "distance" between Eurozone countries would have a comparatively smaller impact on bilateral trade flows by virtue of the countries' shared currency relative to the impact of such determinants on bilateral trade flows between two countries that do not share a currency. Alternatively, such determinants could have a significant impact on Eurozone trade flows, which might imply that the euro currency union is ill fit for this area whose countries are culturally and institutionally diverse.

1. Introduction

This paper sets out to study the role of cultural and institutional differences across European countries in explaining patterns of bilateral trade within Europe. This paper will do so by using a gravity model approach on panel data for 24 European countries, covering the years 2002 through 2006. It may be expected that cultural and institutional "distance" between Eurozone countries would have a comparatively smaller impact on bilateral trade flows by virtue of the countries' shared currency relative to the impact of such determinants on bilateral trade flows between two countries that do not share a currency. Alternatively, such determinants could have a significant impact on Eurozone trade flows, which might imply that the euro currency union is ill fit for this area whose countries are culturally and institutionally diverse.

By measuring and comparing the sensitivity of Eurozone and non-Eurozone bilateral trade flows to measures of cultural and institutional distance and institutional quality, one can also gain insight into how well the adoption of a common currency by Eurozone countries has fostered a single market and encouraged synchronization of Eurozone business cycles. The results of this analysis may then have implications for how effectively the Eurozone could develop further into a so-called single market for trade.

In order to contextualize and justify this inquiry, a literature review (Section 2) follows that first recounts the origin of the concept of a single market for Europe and then subsequently shows how the level of intra-European trade was invoked as a key determinant in convergence prospects of the initial entrants of the Eurozone. I then review research on the relationship of trade flows and business cycle synchronization, as well as initial estimates of the effect of Eurozone membership on trade. I then relate those estimates to estimates of the level of business cycle convergence among Eurozone countries. Finally, I discuss certain studies that have sought to isolate and measure cultural and institutional determinants of bilateral trade flows in the gravity model of trade. The remainder of the paper then has the following structure. In Section 3, I will describe the dataset I use. In Section 4, I will detail the gravity model strategy. In Section 5, I will present and summarize my results, and Section 6 will include a brief discussion and conclusion.

2. Literature Review

A European single market has its legislative origin in the Single European Act of 1986, which set a goal of creating a single market for the European Union by 1993. Its creation included removing trade barriers and controls between member countries and encouraging freer labor mobility and circulation of services.

(European Commission 2012). This single market was dynamized in 1999 with the creation of a common currency for what are now 19 of the European Union's 28 member countries. The euro was heralded for its potential to reduce currency exchange costs and risks of trade, though whether these features have led outright to increased levels of trade is a question considered below (European Commission 2012).

But the question of whether Europe is in fact an optimal area for a common currency has been long debated—indeed, Robert Mundell's pioneering paper on optimal currency areas (OCAs) cited opposing views on this topic in 1961 (Mundell, 1961, p.661). More recently, Bayoumi and Eichengreen (1997) "operationalized" OCA theory to predict the readiness of the relevant EU countries for adoption of a common currency by showing that the theoretical determinants of exchange rate variability between two countries (similarity in trade composition, deviations in real output over time, relative size of economies) have empirical significance, and thus permit forecasting. Bayoumi and Eichengreen's OCA index is based on a measure of a country's relative exchange rate variability and thus maintains a negative relationship with Eurozone readiness. For the most part, the authors forecasted convergence of the Eurozone participants' economies over time and in line with expectations as detailed in the Maastricht Treaty. However, their finding that much of the difference in the OCA index across countries can be attributed to differences in bilateral trade, with higher levels of intra-European trade associated with promising convergence prospects, supports the inquiry of this research paper. As Bayoumi and Eichengreen point out, a more complete Single Market, visible in the form of higher levels of EU bilateral trade, would encourage better convergence prospects, and vice versa.

Additionally, Frankel and Rose (1998) have shown that, historically, greater levels of bilateral trade between countries are associated with greater synchronization between those economies' business cycles. Yet, Frankel and Rose explain, because entry into an OCA such as the Eurozone could increase intra-OCA trade and therefore result in greater synchronization post-accession, it may be best to judge integration prospects *ex post.* Thus, by dealing with trade flows in the Eurozone relative to trade flows in other regions in the years *after* the adoption of the euro, this paper could have implications for the synchronization of Eurozone business cycles.

Furthermore, Clark and van Wincoop (2001) compared correlations of employment and output levels as a measure of business cycle synchronization between EU countries and between the nine U.S. Census regions in the later decades of the 20th century. The authors find that, while U.S Census region business cycles appeared to be more synchronized than the relevant EU countries due to the lack of national borders between Census regions, much of this "border

effect" on synchronization arose from comparatively lower levels of trade among EU countries.

The question of whether the euro has had a significant impact on trade flows within the Eurozone has been a source of debate in the relevant literature. In an article for the Centre for Economic Policy Research, Reuven Glick and Andrew Rose (2015) provide a concise overview of recent findings. After Rose (2000) found on average a near tripling of trade after entry into a currency union, different methods of analysis and several meta-analyses have consistently found a smaller currency union effect on trade, and widely varying and potentially diminishing estimates for the Eurozone in particular. The authors conclude that the magnitude and occasionally even the sign of a euro effect on trade depend on the econometric methodology used. In their view, the euro has had a positive but modest impact on exports for Eurozone countries.

Such a weak trade effect could contribute to the lack of additional synchronization in Eurozone countries' business cycles post-euro adoption. Indeed, Camacho et al. (2006) conclude, based on the recent literature, that "trade-linkages are relevant in explaining [business cycle] comovements," but use several different measurement methodologies of business cycle correlation to conclude "there are no appreciable gains in synchronization among the Eurozone countries in the last decade" (Camacho et al. p.1701, p.1695). De Haan et al. (2007) provide an extensive overview of studies on business cycle convergence in Europe and conclude that the evidence for greater synchronization in the Eurozone is weighted almost equally with opposing evidence, and that much depends on timeframe and method. The authors then show that most studies find trade intensity to be the most significant driver of business cycle convergence.

The strategy of using non-traditional variables to explain trade flows has its origin in the gravity model of trade, pioneered by Dutch economist Jan Tinbergen in 1962, which predicts bilateral trade flows that are based on the relative size and proximity of the involved economies, measured using GDP, actual land area, and other measurements. Subsequent research has shown that many variables measuring "similarity" of economies can significantly predict the level of trade between countries as well.

Srivastava and Green (1986) are motivated by Linnemann's influential 1966 study of innovative determinants of international trade, and thus include such factors as religion and language in studying bilateral trade determinants. The authors explain that the tendency for large economies, measured by level of gross output, to trade with other large economies is obvious and could "overwhelm" the impact of other country characteristics (p.625). Thus to combat this, they use as a dependent variable an index that is a ratio of actual trade intensity between two countries to expected intensity. By scaling actual bilateral trade flows between, for example, country X and country Y with respect to the proportion of trade

country X engages in with *all* countries, the authors try to neutralize the overpowering impact of the most trade happening between the largest economies. While they find that distance still significantly determines trade flows, the authors also find significant roles for political instability of exporting countries (varies negatively with trade intensity) and similar language and religion (varies positively).

Anderson and Marcouiller (2002) are concerned with "insecurity in international trade," and accordingly, they develop a model that takes into account the quality of a country's legal system (specifically, its ability to enforce commercial contracts) and the transparency of a country's government in impacting relative import demand. They use data from the World Economic Forum's Executive Survey, which includes questions relevant to the institutional aspects of a country as cited above. The authors find that institutional differences that result in varying levels of "security" in carrying out trade transactions impact international trade patterns. The authors assert that their findings may help to explain why high-income countries disproportionately engage in trade with other high-income countries—there exists safer trade opportunities between countries of this sort than between high-income and low-income countries, which typically have less hospitable institutional conditions for trade. De Groot et al. (2004) confirm the importance of including a measure of institutional quality and similarity in gravity model specification by showing, in line with Anderson and Marcouiller (2002), that such a measure does much to explain why high-income countries tend to trade more with each other

Linders et al. (2005) expand on this topic by using a nuanced measure of cultural dissimilarity, Geert Hofstede's 1980 index based on a comparison of IBM employees' views in 40 countries on 4 values based questions, as well as measures of institutional quality and institutional similarity between two countries, which are also based on a quality scores. The authors construct a standard gravity model, and then add in dummies for common language, colonial history, religion, and borders. They find that additional variables are all significant and positively related to bilateral trade flows, though GDP sizes and distance still explain a majority of the variance in bilateral trade flows. When they add their measures of cultural and institutional "distance" to the gravity specification, they find expectedly that institutional similarity and quality varies positively with trade flows, and curiously, that cultural *dissimilarity* varies positively and significantly with the trade flows variable. Their explanation of this unexpected relationship between cultural dissimilarity and bilateral trade flows is that culturally distant countries may also experience high costs of domestic production, and thus would choose to trade instead. This explanation does not seem completely sensible and they note the cultural dissimilarity variable explains relatively little of the overall variation in bilateral trade flows between countries.

In this literature review, I have tried to move sequentially in constructing the basis for my inquiry. To recount, the euro was established to strengthen the European single market by reducing exchange rate costs and risks between Eurozone countries. However, research showed that the probability of successful convergence of the potential Eurozone countries increased with the level of intra-Eurozone trade. And quite often, business cycle synchronization between two countries increases with the intensity of their trade relationship. I then recounted the fact that the euro effect on trade, overall, has been found to be modestly positive, and that business cycle synchronization among Eurozone countries has not been found outright to have increased. Finally, I surveyed some of the literature that incorporates measures of cultural distance and institutional quality into gravity model explanations of trade flows. Thus, whether cultural and institutional differences among Eurozone countries have had an impact on their bilateral trade patterns, despite a shared currency, might partially reveal reasons for the lackluster measurements of a euro effect on trade, and by extension, weak business cycle synchronization in the Eurozone.

3. The Dataset

The dataset I use was obtained from Andrew K. Rose's website[1], filtered to only include 24 European countries, and then augmented with additional variables specific to interest of this paper. The dataset covers the years 2002 to 2006, during which time the Euro currency was fully in circulation in 11 of the countries in my sample and not for the other 13 countries. See Appendix A for the list of countries.

The dataset includes the standard gravity model variables for each country (see Appendix B). For example, real GDP and GDP per capita in USD, the value of Free on Board exports and Cost, Insurance, and Freight imports between the country pair in constant USD, the straight line distance between the country pair's capitals, a dummy that is 1 if the countries share a language, a dummy that is 1 if the countries share a border, and so on. To detect the impact of being in the Eurozone, I create a dummy that is 1 if *one* country in a pair is a Eurozone member, and 0 otherwise, and a dummy that is 1 if *both* countries are Eurozone members, and 0 otherwise. I follow Linders (2005) closely in selecting measures of cultural distance, institutional quality, and institutional distance, which I now will discuss.

As a measure of culture across countries, I use Geert Hofstede's dimensions of national culture, which were originally compiled in 1980 by surveying IBM employees in 40 different countries on the topics of power

[1] http://faculty.haas.berkeley.edu/arose/RecRes.htm#Reverse

distance, uncertainty, individualism vs. collectivism, and masculinity vs. femininity to create 4 dimensions of culture. The dimension scores, which range from 0 to 100, are updated periodically and have been expanded to over 80 countries. See Appendix B and Linders (2005) for a more in-depth discussion of Hofstede's dimensions of national culture.

It is worth noting that the availability of Hofstede's data was a limiting factor in selecting my sample. Countries such as Croatia, Cyprus, and Iceland were missing from the dimensions dataset to which I had access, which forced me to omit these countries from my sample.

I use the six dimensions of the World Bank's Worldwide Governance Indicators (WGI) to create a measure of institutional quality and distance between country pairs. Scores for each dimension range from -2.5 to 2.5, and the dimensions include, for example, measures of the political stability of a country's government and its ability to limit corruption. Again, see Appendix B and Linders (2005) for a more in-depth discussion of the WGI. The institutional quality of a country is calculated as the average of the country's scores across the six dimensions.

While Hofstede's cultural dimensions and the WGI provide an indication of national culture and institutional quality for each individual country, respectively, it is the interest of this paper to obtain a measure of "distance" between the two countries in a trading partnership. To do so, I employ the method described in Kogut and Singh (1988), where "distance" is calculated as the average of the differences in dimension scores between a country pair, with each difference being scaled by the variance of that dimension's scores across all countries. Symbolically, for a measure with c = 4 dimensions, the distance between country_i and country_j, is,

$$Distance_{ij} = \frac{1}{4}\sum_{c=1}^{4}(C_{ci} - C_{Cj})^2/V_c$$

, where C_{ci} is the score for country_i on the cth dimension, C_{cj} is the score for country_j on the cth dimension, and V_c is the variance of the score of that dimension across all countries. I carry out this calculation for the dimensions of both the cultural and institutional measures. Germany and Switzerland are culturally the most proximate of any country pair, with a cultural distance measure of 0.028. On the other hand, Denmark and the Slovak Republic are culturally the most distant of any country pair, with a cultural distance measure of 7.90. Institutionally, Sweden and Switzerland are the most proximate with a distance of 0.024. Finland and Romania are institutionally the most distant, with a distance of 10.03.

4. The Strategy

As was detailed in Section 2, the gravity model of trade has been used extensively to predict the magnitude of bilateral trade flows based on characteristics of the two countries that are trading, and it will be used in this paper as well. The gravity model of trade is inspired by Newton's Law of Universal Gravitation, and has as its basic form:

$$T_{ij} = G(\frac{M_i^{\beta_1} \times M_j^{\beta_2}}{D_{ij}^{\beta_3}})$$

,where T_{ij} is some measure of the volume of trade from country$_i$ to country$_j$, G is a constant term, M represents the "economic mass" of country$_i$ and country$_j$, typically GDP, and D_{ij} isthe distance between the two countries. This equation is then typically log transformed to take the following form:

$$\ln(T_{ij}) = \beta_0 + \beta_1 \ln(M_i) + \beta_2 \ln(M_j) - \beta_3 \ln(D_{ij}) + \varepsilon_{ij}$$

This form allows for an OLS estimation in which the β coefficients on the natural log of continuous variables represent elasticities between those variables and the dependent variable; as in, a 1% increase in M_i (typically GDP of country$_i$) is associated with a β_1 % increase in trade from country$_i$ to country$_j$. The specification of the full gravity equation for this analysis is as follows:

$$\begin{aligned}\ln c(T_{12t}) = {} & \beta_0 + \beta_1 \ln(GDP_{1t}) + \beta_2 \ln(GDP_{2t}) + \beta_3 \ln(GDP/cap_{1t}) \\ & + \beta_4 \ln(GDP/cap_{2t}) + \beta_5 \ln(Dist_{12}) + \beta_6 Border_{12} + \beta_7 Lang_{12} \\ & + \beta_8 CultDist_{12} + \beta_8 InstDist_{12} + \beta_9 IQ_1 + \beta_{10} IQ_2 + \beta_{11} SingleEZ_{12} \\ & + \beta_{12} DualEZ_{12} \varepsilon_{ij} + B_{13-16} InteractionTerm\end{aligned}$$

To reiterate certain variable details from Section 3[2],

- T_{12t} is the FOB exports in standard USD from country 1 to country 2 in year t
- *Border* is 1 if country 1 and country 2 share a land border, 0 otherwise
- *Lang* is 1 if a country pair shares a dominant language, 0 otherwise
- $InstDist_{12}$ is the distance between a country pair's quality of governance and institutions
- $CultDist_{12}$ is the distance between a country pair's national culture
- IQ is a country's institutional quality

[2] See Appendix B for full dataset description

- *SingleEZ*$_{12}$ is 1 if one of the countries in the country pair uses the Euro, and 0 otherwise
- *DualEZ*$_{12}$ is 1 if both of the countries in the country pair uses the Euro, and 0 otherwise
- *Interactions* include the following interaction terms: (*SingleEZ* x *CultDist*), (*DualEZ* x *CultDist*), *(SingleEZ* x *InstDist*), and (*DualEZ* x *InstDist*)

The main variables of interest are $CultDist_{12}$ and *InstDist*$_{12}$, the dummy variables *SingleEZ*$_{12}$ and *DualEZ*$_{12}$, the *IQ* variables, and the interaction terms. The interaction terms will indicate if there is a significantly different impact of cultural and institutional distance on trade depending on whether there are 0,1, or 2 Eurozone members in the trading pair. Note that the impact on a log-transformed dependent variable of a non-log transformed variable in an OLS estimate is, in percent, the following:

$$impact = \left(e^{\beta_i} - 1\right) \times 100\%$$

For example, a coefficient of 0.50 on the *Border* dummy would imply countries that share a landlocked border engage in 65% more trade than those that do not. Having detailed the estimating equation of this gravity model analysis, I will summarize the results of analyses in Section 5.

5. Results

I first run a basic specification of the gravity model and then add a dummy variable indicating if the country pair shares a land border, and then a dummy variable indicating whether the country pair shares a language. The results are below, in Table 1[3].

As is typical in gravity model estimations, these regressions result in high R-squared statistics and high t-statistics. A 1% increase in the exporting country's GDP increases trade between a country pair by 0.97%, and by 0.81% for a 1% increase in the importing country's GDP. Distance decreases the amount of trade between a country pair, while country pairs that share a border trade 33% more with each other than countries that do not. The results from adding a common language dummy indicate that country pairs that share a language trade 16% *less* than pairs that do not, though the coefficient on this dummy is the only one to not

[3] Standard R-squared measures are included for all regressions ran in this paper; adjusted R-squared measures were calculated and were insignificantly different from the R-squared listed.

be significant at the 1% across all three regressions. Moreover, this negative relationship could arise from the nature of this sample, where few countries share a language, allowing certain country pairs to greatly influence this relationship. After controlling for common language, the border effect on trade increases to 39%, implying that some omitted variable bias was introduced by failing to include these dummies jointly.

Table 1. Basic Estimates

VARIABLES	(1) Basic Model	(2) Border	(3) Common Language
Log GDP Exporter	0.967***	0.965***	0.965***
	(64.41)	(64.43)	(64.43)
Log GDP Importer	0.813***	0.808***	0.803***
	(52.12)	(52.35)	(50.76)
Log GDP/cap Exporter	0.471***	0.473***	0.486***
	(14.89)	(15.06)	(15.22)
Log GDP/cap Importer	0.610***	0.612***	0.626***
	(20.08)	(20.30)	(20.03)
Log Distance	-1.362***	-1.262***	-1.264***
	(-47.38)	(-32.25)	(-32.28)
Border dummy		0.282***	0.331***
		(5.104)	(5.843)
Language dummy			-0.163**
			(-2.433)
Constant	-42.10***	-42.66***	-42.78***
	(-59.25)	(-58.23)	(-58.47)
Observations	2,757	2,757	2,757
R-squared	0.880	0.880	0.881

Robust t-statistics in parentheses, dependent variable: log(exports 1 to 2)
*** p<0.01, ** p<0.05, * p<0.1

Following Linders (2005) and Helpman *et. al.* (2004), as a way to measure the contribution of each variable to the overall variance in trade between country pairs, and in doing so, put the coefficient estimates in perspective[4], I calculate a standardized beta coefficient, β_{Si}, for each independent variable.

[4] Which is needed, given that the gravity model produces coefficient estimates that are usually significant at the highest levels across the board.

This calculation takes the following form,

$$\beta_{Si} = \frac{\beta_i \times \sigma_{Si}}{\sigma_{\log(Exp12)}} \times 100\%$$

, where the estimated beta is multiplied by the standard deviation of the independent variable it is associated with and is scaled by the standard deviation of the dependent variable, which is log of exports from country 1 to country 2. See Appendix C, Table I for the full table of standardized betas. The table shows that the GDP of the importer and exporter countries (which, in terms of Newton's original gravity equation, is their "mass") accounts for a large part of variation in trade across country pairs, as does the distance between countries.

In Table 2, I add the cultural distance, institutional distance, and institutional quality measures to the gravity model specification sequentially. In Model 1, the coefficient on cultural distance is negative and significant at the 1% level, implying that country pairs that are culturally more distant trade less. The measure of institutional distance is added in Model 2 and is not significant even at the 10% level, implying that institutional distance between country pairs in Europe does not impact trade flows.

However, after adding measures of exporter and importer institutional quality in Model 3 (which have a significantly positive impact on trade), the coefficient on institutional distance becomes significant at the 1% level, implying that, holding constant the quality of institutions in country pairs, institutional distance does have some role, albeit a small one, to play in determining trade flows. It is also worth noting that the coefficient on GDP per capita in both the exporting and importing country of a country pair decreases when the measures of institutional quality in the country pair are included in the estimation. Indeed, GDP per capita in the importing country becomes insignificant in Model 3, indicating that institutional quality and GDP per capita, interpreted as the "wealth" of a country, are highly correlated, and as Anderson and Marcouiller (2002) have shown, help to explain why high-income countries trade disproportionately more with each other.

The standardized contributions of the independent variables in Model 3 to variations in trade are listed in Appendix C, Table II. GDPs and distance still make the largest contributions to the variation in trade between countries, yet the institutional and cultural determinants contribute between 2% and 14%, with the institutional qualities of the countries in a pair having the greatest impact on the variation in trade flows.

Table 2. Estimates with Cultural and Institutional Measures

VARIABLES	(1) Cultural Distance	(2) Institutional Distance	(3) Institutional Quality
Log GDP Exporter	0.964***	0.964***	0.992***
	(64.39)	(64.34)	(64.71)
Log GDP Importer	0.807***	0.811***	0.881***
	(51.23)	(47.56)	(50.08)
Log GDP/cap Exporter	0.490***	0.498***	0.270***
	(15.53)	(15.42)	(7.399)
Log GDP/cap Importer	0.583***	0.564***	0.0134
	(18.27)	(14.90)	(0.244)
Log Distance	-1.238***	-1.232***	-1.222***
	(-32.24)	(-30.73)	(-32.89)
Border dummy	0.316***	0.316***	0.288***
	(5.484)	(5.487)	(5.002)
Language dummy	-0.168**	-0.165**	-0.223***
	(-2.490)	(-2.445)	(-3.387)
Cultural Distance	-0.0518***	-0.0487***	-0.0668***
	(-4.779)	(-4.007)	(-5.521)
Institutional Distance		-0.00872	-0.0278***
		(-0.836)	(-2.833)
Inst. Quality Exporter			0.650***
			(15.85)
Inst. Quality Importer			0.339***
			(7.799)
Constant	-42.56***	-42.58***	-38.46***
	(-57.39)	(-57.07)	(-49.29)
Observations	2,757	2,757	2,757
R-squared	0.882	0.882	0.891

Robust t-statistics in parentheses, dependent variable: log(exports 1 to 2) *** p<0.01, ** p<0.05, * p<0.1

In Table 3, I add the dummies of interest indicating how many of the countries in a trading pair were members of the Eurozone for the period 2002-2006. Model 1 is the full specification so far, and the same as column 3 in Table 2. Model 2 includes the 1 Eurozone Member dummy and the 2 Eurozone Members dummy. The results indicate that a country pair in which one of the countries uses the Euro will trade 12% more than a country pair in which neither country uses the Euro. And, a country pair in which both countries use the Euro will trade 30% more than a country pair in which neither country uses the Euro. It

is worth noting that the trade increase from doubling the amount of countries in a pair that use the Euro (from 1 to 2) more than doubles the predicted amount of trade between the country pair (12% to 30%). This implies that there exists some amount of synergy among Eurozone countries, relative to the amount of trade that occurs between Eurozone countries and non-Eurozone European countries.

Table 3. Estimates with Eurozone Member Dummies

	(1)	(2)	(3)
VARIABLES	Full Model	Eurozone Dummies	Without Institutional Quality Controls
Log GDP Exporter	0.992***	0.979***	0.959***
	(64.71)	(63.94)	(63.27)
Log GDP Importer	0.881***	0.867***	0.805***
	(50.08)	(47.30)	(43.89)
Log GDP/cap Exporter	0.270***	0.217***	0.486***
	(7.399)	(5.481)	(13.85)
Log GDP/cap Importer	0.0134	-0.0700	0.553***
	(0.244)	(-1.252)	(14.42)
Log Distance	-1.222***	-1.276***	-1.250***
	(-32.89)	(-30.10)	(-27.33)
Border dummy	0.288***	0.221***	0.296***
	(5.002)	(3.575)	(4.777)
Language dummy	-0.223***	-0.200***	-0.157**
	(-3.387)	(-3.050)	(-2.331)
Cultural Distance	-0.0668***	-0.0627***	-0.0469***
	(-5.521)	(-5.300)	(-3.912)
Institutional Distance	-0.0278***	-0.0263***	-0.00761
	(-2.833)	(-2.632)	(-0.712)
Inst. Quality Exporter	0.650***	0.692***	
	(15.85)	(16.95)	
Inst. Quality Importer	0.339***	0.380***	
	(7.799)	(8.614)	
1 EZ Member dummy		0.115**	0.0420
		(2.552)	(0.902)
2 EZ Members dummy		0.261***	0.0788
		(4.617)	(1.339)
Constant	-38.46***	-36.24***	-42.00***
	(-49.29)	(-37.69)	(-45.47)
Observations	2,757	2,757	2,757
R-squared	0.891	0.892	0.882

Robust t-stats in parentheses, dependent variable: log(exp 1 to 2); *** p<0.01, ** p<0.05, * p<0.1

But, Model 3, which excludes the measures of institutional quality in the exporting and importing country, shows that those variables in fact strengthen the Eurozone impact on trade in both size and significance. Indeed, in Model 3, the

coefficients on the Eurozone dummies decrease substantially and become insignificant. This implies that the institutional quality in the exporting and importing is related the Eurozone status of countries in a trading pair. This makes sense, as Eurozone countries are likely to have stronger institutions given the requirements imposed on countries looking to adopt the euro. Excluding these measures of institutional quality leads to omitted variable bias in estimating the impact Eurozone membership on trade volume between a country pair.

Table 4 shows results from a regression with interaction terms between the Eurozone membership dummies and cultural and institutional distance. Recall that an interaction term between a dummy variable and a continuous variable indicates the added effect of the continuous variable on the dependent variable given that the dummy variable is equal to 1. Accordingly, the impact of cultural distance on trade flows between two Eurozone countries is not statistically different from when neither of the countries is in the Eurozone. When only one of the countries uses the euro, the coefficient on the interaction term is significant and positive, meaning the impact of cultural distance on trade flows is decreased when one country in a trading pair is in the Eurozone. This result could indicate that, all other things equal, the membership of a country in the Eurozone mitigates trade deterrence caused by cultural dissimilarity—the adoption of the euro might signal attractiveness to non-Eurozone countries, but among trade pairs where both countries are in the Eurozone, this signal is not relevant. The coefficients on the interaction terms between Eurozone membership and institutional distance are in fact significant and positive.

When both countries in a trading pair belong to the Eurozone, the negative impact of institutional distance on trade flows is reduced. In other words, it appears that for trading pairs with Eurozone member countries, institutional distance has a smaller role to play in determining trade flows.

Table 4. Estimates with Eurozone-Distance Interactions

VARIABLES	(1) Cultural Distance-Eurozone Interaction	(2) Institutional Distance-Eurozone Interaction
Log GDP Exporter	0.985***	0.989***
	(64.50)	(63.13)
Log GDP Importer	0.866***	0.874***
	(47.98)	(49.14)
Log GDP/cap Exporter	0.213***	0.238***
	(5.442)	(5.998)
Log GDP/cap Importer	-0.0862	-0.126**
	(-1.560)	(-2.257)
Log Distance	-1.278***	-1.285***
	(-30.21)	(-30.61)
Border dummy	0.169***	0.157***
	(2.845)	(2.728)
Cultural Distance	-0.107***	-0.0508***
	(-5.009)	(-4.164)
Institutional Distance	-0.0234**	-0.0957***
	(-2.284)	(-6.527)
Inst. Quality Exporter	0.686***	0.706***
	(16.76)	(17.20)
Inst. Quality Importer	0.374***	0.395***
	(8.518)	(8.947)
1 Eurozone Member	-0.0634	-0.109*
	(-0.897)	(-1.766)
2 Eurozone Members	0.177**	0.00175
	(2.134)	(0.0248)
1 EZ Member x CultDist	0.0795***	
	(3.546)	
2 EZ Members x CultDist	0.0345	
	(1.074)	
1 EZ Member x InstDist		0.0976***
		(6.107)
2 EZ Members x InstDist		0.145***
		(5.848)
Constant	-36.07***	-36.21***
	(-37.02)	(-37.19)
Observations	2,757	2,757
R-squared	0.892	0.894

Robust t-statistics in parentheses; dependent variable: log(exp 1 to 2); *** p<0.01, ** p<0.05, * p<0.1

Section 6. Discussion and Conclusion

To summarize, the above gravity model estimations show that, while the GDP of the exporting and importing countries and the distance between them determine a large part of variations in trade flows among European countries, measures of cultural and institutional distance and institutional quality are statistically significant in their relationship with trade flows. The role of institutional quality in each of the countries in a trading pair is the greatest of these three parameters, and once controlled for, weakens the effect of a country's GDP per capita on trade flows.

When controlling for the cultural and institutional distance of country pairs, the trade effect of being in the Eurozone is minimal. Indeed, after including the Eurozone dummies and thus holding constant Eurozone membership, the coefficients on cultural and institutional distance remained negative and significant. Yet, the institutional quality in the countries in a trading pair does seem to be related to Eurozone membership. Dropping measures of institutional quality renders the Eurozone dummies again insignificant. The variables measuring institutional quality strengthen the trade impact of adopting the euro, generating a significantly positive trade boost from being a Eurozone member. The result that Eurozone membership and institutional quality are jointly significant implies that institutional *quality* impacts trade flows even within the Eurozone.

After including interaction terms between the Eurozone membership dummies and cultural and institutional distance measurements, it appears that cultural distance plays an equally strong role regardless of whether both countries in a pair use the euro. However, the role of institutional distance in determining trade flows appears to be neutralized when Eurozone countries are trading with each other, indicating that, while quality of institutions still matters, institutional similarity does not for Eurozone trading parternships.

The analysis of this paper could be strengthened in a couple of ways. The inclusion of a multilateral trade resistance term, measuring relative trading costs, might remove bias caused by the proximity of large economies like Germany and France in diverting trade between otherwise similar economies (see Anderson, Van Wincoop 2004). Controlling for the distortion caused by large European economies might cause cultural and institutional distance to have a changed impact on trade flows. This analysis might also benefit from sensitivity tests to the other measures of culture and institutions that exist. Additionally, an analysis of this sort could benefit from expansion of the sample size. It could be that most of the trade in Europe happens between Eurozone, regardless of institutional and cultural differences, which could bias results in a sample that only includes European countries. In a perfect world, one would be able to have large and

identical groupings of countries and administer a "treatment" that is the adoption of a common currency by one of the groupings. Though this is not a perfect world, a better study design likely exists and might shed more light on the impact of common currencies, culture, and institutions on trade flows.

Of course, it is still relatively early days for the euro as a common currency in Europe. Assuredly, cultures and institutions are slow to change, and if quality of institutions is related to the rate of change of the institutions in a country, this could further exacerbate disparities. It could very well be that adoption of the euro has not yet had enough time to "bridge" the gaps of institutional quality between Eurozone countries, or might never. It does appear that institutional differences do have smaller effects on trade within the Eurozone. This suggests that Eurozone countries with relatively weaker institutions should focus on improving the absolute quality of their governance and not conforming to their fellow currency union members' institutional standards. The results of this analysis have promising implications for the future of the Eurozone, yet events such as Europe's on-going debt crisis and its response to the migrant crisis are indications that differences and obstacles exist that are likely to prevent quicker synchronization of European sentiments and economies.

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Appendix A: Countries in the sample

For 2002-2006:

Countries **not in** Eurozone	Countries **in** Eurozone
Bulgaria	Austria
Czech Republic	Belgium-Luxembourg*
Denmark	Finland
Estonia	France
Hungary	Germany
Malta	Greece
Norway	Ireland
Poland	Italy
Romania	Netherlands
Slovak Republic	Portugal
Sweden	Spain
Switzerland	-
United Kingdom	-

*Standard trade data counts Belgium and Luxembourg as one entity and aggregates their trade

Appendix B: Description of Data

Variables in dataset, with each observation being a country pair containing Country 1 and Country 2:

- Year
- FOB Exports from Country 1 to Country 2 in constant USD
- CIF Imports into Country 2 from Country 1 in constant USD
- Border, equal to 1 if Country 1 and Country 2 share a land border, 0 otherwise
- Colony, equal to 1 if Country 1 and Country 2 were ever in a colonial relationship, 0 otherwise
- Language, equal to 1 if Country 1 and Country 2 share a language, 0 otherwise
- GDP of Country 1 in real USD, from World Bank
- GDP of Country 2 in real USD, from World Bank
- GDP per capita of Country 1 in real USD, from World Bank
- GDP per capita of Country 2 in real USD, from World Bank
- Landlocked, 0 if neither countries are landlock, 1 if one is, 2 if both are
- Log Distance, log of straight line distance between capitals of the country pair
- SingleEZ, equal to 1 if one country in the pair uses the Euro, 0 otherwise

- DualEZ, equal to 1 if both countries use the Euro, 0 otherwise
- Institutional Quality1, arithmetic average of WGI dimension scores for Country 1
- Institutional Quality2, arithmetic average of WGI dimension scores for Country 2
- Institutional Distance between Country 1 and Country 2, see Section 3
- Cultural Distance between Country 1 and Country 2, see Section 3
- The World Bank's Worldwide Governance Indicators, across 6 dimensions:

1. **Voice and Accountability:** Reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
2. **Political Stability and Absence of Violence/Terrorism:** Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.
3. **Government Effectiveness:** Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
4. **Regulatory Quality:** Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
5. **Rule of Law:** Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
6. **Control of Corruption:** Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

Geert Hofstede's 4 Dimensions of National Culture

1. **Power Distance:** the extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed unequally. This represents inequality (more versus less), but defined from below, not from above.

2. **Uncertainty Avoidance:** deals with a society's tolerance for uncertainty and ambiguity. It indicates to what extent a culture programs its members to feel either uncomfortable or comfortable in unstructured situations.
3. **Individualism**: On the individualist side we find societies in which the ties between individuals are loose: everyone is expected to look after her/himself and her/his immediate family. On the collectivist side, we find societies in which people from birth onwards are integrated into strong, cohesive in-groups
4. **Masculinity**: versus its opposite, femininity, refers to the distribution of emotional roles between the genders which is another fundamental issue for any society to which a range of solutions are found.

Appendix C: Standardized Coefficients

I. Relative Contributions of Independent Variables to Trade Variation, Basic Specification

Variables, taken from Basic Specification (Table 1)	Standardized Beta, %	Trade Effect if Dummy=1
Log GDP Exporter	54	-
Log GDP Importer	44	-
Log GDP/cap Exporter	9	-
Log GDP/cap Importer	14	-
Log Distance	31	-
Border dummy	5	39%
Language dummy	2	-16%

II. Relative Contributions of Independent Variables to Trade Variation, Cultural and Institutional Specification

Variables, taken from Table 2, Column 3	Standardized Beta, %	Trade Effect if Dummy=1
Log GDP Exporter	56	-
Log GDP Importer	49	-
Log GDP/cap Exporter	5	-
Log GDP/cap Importer	2	-
Log Distance	30	-
Border dummy	4	33%
Language dummy	3	-20%
Cultural Distance	5	-
Institutional Distance	2	-

Inst. Quality Exporter	14	-
Inst. Quality Importer	8	-

III. Relative Contributions of Independent Variables to Trade Variation, Eurozone Dummies Specification

Variables, taken from Table 3 (Column 2)	**Standardized Beta, %**	**Trade Effect if Dummy=1**
Log GDP Exporter	55	-
Log GDP Importer	48	-
Log GDP/cap Exporter	4	-
Log GDP/cap Importer	2	-
Log Distance	31	-
Border dummy	3	25%
Language dummy	3	-18%
Cultural Distance	4	-
Institutional Distance	2	-
Inst. Quality Exporter	15	-
Inst. Quality Importer	8	-
1 EZ Member dummy	2	12%
2 EZ Members dummy	5	30%