Cultural Distance and Trade Within Europe

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Abstract

Economic integration and collaboration have eliminated almost all formal barriers to trade within the European Union and created a common currency for nineteen countries. However, the individual countries in this common market area still differ widely in cultural values and believes. Culture plays an important role in international business and trade, therefore this paper studies the effects of cultural distance on trade within Europe. With data from the World Values Survey on cultural values and believes as well as trade flows between thirty-two European countries over the years 1995 to 2014, a panel data set is constructed. Analysing this data within a gravity model context, this paper shows that differences in values and beliefs reduce trade between countries. Even when controlling for cultural similarities and instrumenting cultural affinity with tourism data, the effect of cultural distance on trade is negative.

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1. Introduction

The aim of this paper is to provide empirical evidence for the effects of cultural distance on the trade flows between European countries. Data from the World Values Survey, measuring values and believes in 32 European countries over the period 1995 until 2014, is matched with the trade flows between those countries in the same period. This creates a large panel data set that is the main tool to investigate the sign and the size of the effects of cultural distance between countries. Additionally, the analysis is extended with tourist flows between countries as an explanatory variable next to trust and individualism.

Cultural differences have gained importance in academic circles in the past decades, as cultural differences have been found to affect a diverse set of economic outcomes. Guiso, Sapienza and Zingales (2009) found that differences in values and beliefs decrease foreign direct investment between countries. Next to this, the volume of mergers and acquisitions is lower when countries have a higher cultural distance (Ahern, Daminelli, & Fracassi, 2012). And when lenders and borrowers share more values, interest rates are often lower (Giannetti & Yafeh, 2012). With respect to trade it has been commonly agreed that cultural differences reduce exports in goods between countries (Frankel, 1997; Melitz, 2008; Felbermayr & Toubal, 2010).

A possibility is that people are biased against cultures that are highly different from their own culture, or biased in favour of cultures that are more like their own. This is easily illustrated by tourism figures of Dutch citizens, as the four most popular destinations are Germany, Spain, France and Austria (Kakebeeke & Molenaar, 2016). Despite the increasing trend in long distance travelling (Telegraaf, 2015), these destinations are all western European countries with similar values and beliefs. It is feasible that when people feel more attracted to another countries' culture, they will have similar feelings towards the goods from that country.

The effects of cultural distance between countries on the trade flows between those countries, as well as the implications these effects have for economic integration, are especially relevant to Europe. Since the foundation of the European Coal and Steel Community in 1951, the aim of European collaboration has been to integrate national markets into one large European market and reduce all internal barriers to trade. With the construction of the Schengen area, virtually all barriers, such as borders and extensive paperwork, have been removed (Allington, Waldmann, & Kattuman, 2004).

After the 2008 financial crises however, there has been a surge in political parties across European countries that emphasize the cultural differences between the countries in the European Union. Examples are the Freedom party in the Netherlands, Front National in France, Alternative für Deutschland in Germany, the Austrian Freedom party and the Swiss People's party. The fact that these parties are gaining sometimes as much as 35 percent of the votes in national elections (BBC, 2016),

shows that the European single market is not so integrated and homogenous as the economic reality suggests. Recently these feelings in support of a national culture, and more importantly the strong rejection of the idea of common European values, has lead the British to vote against membership in the EU (The Economist, 2016).

This combination of a nearly perfectly integrated market in strict economic sense and rising cultural nationalism within that market gives rise to the following research question

What are the effects of cultural distance on trade between European countries?

The rest of this paper is structured as follows, section two is the theoretical framework from which the hypotheses are derived and an overview of the existing literature is given. After that comes the empirical analysis, where the variables of interest are described and their hypothesised sign is stated. Section four of this paper specifies the methodology used to analyse the data, it defines the gravity model used to model trade flows and explains why certain econometric approaches are preferred over others. In the fifth section, the results are displayed and shortly discussed after which section six offers an alternative approach. Data on tourist visits between countries are added to the regression analysis as an instrument for affinity between trading countries. Lastly, the results will be summarised before drawing a conclusion from which recommendations for future research are made.

2. Theoretical Framework

The theoretical foundation for this thesis is the gravity model of trade. Originally derived by Tinbergen (1962), the gravity equation was given a solid theoretical base with the works of Anderson (1979) as well as Helpman and Krugman (1985). Anderson (1979) showed that the gravity equation potentially has a very high efficiency when explaining trade flows. Helpman and Krugman (1985) used the gravity equation in a setting of imperfect competition. With the use of the gravity equation they argued against the comparative advantage theory of trade and the Heckscher-Ohlin model (Helpman & Krugman, 1985). In the setting of Helpman and Krugman (1985) even identical countries traded with each other as it is assumed that their goods are differentiated.

One of the most common applications of the gravity equation has been to model trade flows between countries as a function of their GDP's and the geographical distance between those countries (Tinbergen, 1962; Redding & Venables, 2004). Other researches have used the gravity equation to calculate how trade flows are affected by tariff rates (Oguledo & Macphee, 1994), international borders (McCallum, 1995), currency unions (Rose & Van Wincoop, 2001), and free trade agreements (Frankel, 1997; Soloaga & Winters, 2001). Next to the field of trade research, the gravity equation has been applied on other 'bilateral flows' such as foreign direct investment (FDI) and migration patterns (Anderson J. E., 2011).

The traditional and simplified gravity equation, taught widely in international trade courses, estimates the volume of trade as follows (Anderson J. E., 2011)

$$X_{i,j,t} = Y_{i,t}^{\alpha} * Y_{j,t}^{\beta} * D_{i,j}^{\gamma} \tag{2.1}$$

Where the left hand side (LHS) indicates the volume of exports from country *i* to country *j* at time *t*. The right hand side (RHS) is a Cobb-Douglas function of income *Y* of country *i* at time *t*, income *Y* of country *j* at time *t* and the geographical distance *D* between country *i* and *j*. The exponents α and β give weight to each countries income as an explanation of exports (Anderson J. E., 2011). The exponent γ is negative as trade flows decrease when countries are further apart (Anderson J. E., 2011). An in depth specification of the gravity model that will be used in this paper is given in the methodology section.

The before mentioned variables, borders, tariff rates, currency unions, and free trade agreements, are often included in the term $D_{i,j}^{\gamma}$, making it a vector of all the variables that affect trade. These variables, as well as most other variables used in traditional gravity models, are often easy to measure and straight forward to calculate. With the dawn of behavioural economics however, more and more researches focus on establishing relationships between cultural variables and economic indicators.

Cultural values often have a complex and highly intangible nature (Shenkar, 2001). Moreover, Shenkar (2001) recognises that measuring these values is an even greater challenge than defining them. Nonetheless, cultural values and cultural differences have been applied to international business and economics research in the fields of strategy, management, human resources, FDI, and trade. Widely used is Hofstede's model of cultural dimensions (Hofstede, 1980). Hofstede's model of cultural dimensions initially proposed that cultures differ along four dimensions: power distance, individualism versus collectivism, masculinity versus femininity, and the degree of uncertainty avoidance (Hofstede, 1980). His model was later expanded with a fifth dimension, the trade-off between a forward looking orientation versus a more traditional backward looking orientation (Hofstede & Bond, 1988).

According to Hofstede (1989) culture is the collective programming of the mind which distinguishes the members of one category of people from another category. In the rest of this paper, this statement by Hofstede will be the definition used for culture. It is important to note that a category of people can be any group of persons, therefore different cultures exist between corporations, nations, ethnic groups, industry, or generations (Hofstede, 1989). This research will focus on the differences in national culture between trading countries.

2.1 Cultural values in economics

In international business literature there exist multiple theories that argue why cultural distance between countries should affect business doing between agents from those countries. Perhaps the

most recurring theme in these theories is the phenomenon of transaction costs, which are all costs required to make an exchange (Williamson, 1979). Cultural distance is said to increase transaction costs, therefore cultural differences decrease the net present values (NPV) of transactions resulting in less business doing.

In one way, cultural differences between agents increase uncertainty about the business partner resulting in a higher exposure to risk (Hofstede, 1989). Agents will require a higher compensation for this risk, thus favour transactions with culturally similar business partners over similar transactions with culturally distant partners (Hofstede, 1989). Roth and O'donell (1996) say that transaction costs are increased by higher agency costs between culturally distant business partners. Agency costs are the fees that companies have to pay when it hires an agent. Larger cultural differences make it harder to obtain an agent's info, this makes multinational corporations more dependent on overseas agents. These agents can bargain a higher fee resulting in higher agency costs for the multinational that is hiring them (Roth & O'donell, 1996).

Brouthers and Brouthers (2000) argue that culturally distant people could have different understandings of the same situation. This causes noise between agents from different cultures and results in incomplete contracts (Brouthers & Brouthers, 2000). Moreover, in an experimental setting it has been shown that greater cultural distance reduces the effectiveness of decision making by increasing perceived costs (Glaeser, Laibson, Scheinkman, & Soutter, 2000). This reasoning is similar to the theory involving wage discrimination. Under wage discrimination, an employer dislikes a certain group of workers and has a bias against hiring them as he perceives that they give him an extra cost on top of the wages he has to pay although they are equally costly as other employees (Borjas, 2016). Arguing along these lines, an internationally operating business agent might have a bias against a certain culture, increasing the perceived costs of doing business in this culture. This results in transactions not taking place although they are economically profitable.

Another argument states that it is difficult for multinational companies to transfer skills and competencies from one country to another, and that this becomes increasingly difficult as employees have a higher cultural distance (Pejovich, 2003). More recently, Guiso, Sapienza and Zingales (2006) have argued that beliefs about values can be used to extend traditional economic theory on preferences, implying that not all agents make rational decisions, instead their decisions are influenced by their cultural values. This has for example been used to explain decisions for contracts and job offers (Bartling, Fehr , Maréchal, & Schunk, 2009).

2.2 Differences in cultural values and trade

Cultural differences arise trough formal and informal institutions. Formal institutions of a nation's culture include the prime language, religion, ethnic diversity, and the legal origin (Shenkar, 2001). Next to cultural differences, these formal institutions often affect other costs of doing business as well. When countries share a language this eliminates costs to translate contracts and other papers. Moreover if they have a common legal origin, the contract will face similar laws in both countries making it easier to negotiate.

Informal institutions are the values, views and believes that, according to the definition of culture, distinguish groups of people from each other (Shenkar, 2001; Pejovich, 2003). At the focus of this paper will be the effects of these informal institutions on bilateral trade flows. From now on, cultural distance in this paper will specifically mean the differences in values and believes between two trading countries. Data on formal institutions will be used to control for differences in these institutions as well.

The original gravity equation will be modified to test cultural distance as an explanatory variable of trade flows. This transforms equation 2.1 to

$$X_{i,j,t} = Y_{i,t}^{\alpha} * Y_{j,t}^{\beta} * D_{i,j,}^{\gamma} * CD_{i,j,t}^{\theta} \tag{2.2}$$

Equation 2.2 is similar to 2.1 except for the final variable on the RHS. Next to geographical distance, CD is added which stands for the cultural distance between country *i* and country *j*. Note that cultural distance might change over time as countries grow closer (Shenkar, 2001), hence the subscript *t* which was not included for geographical distance.

There exists a minimal literature on the effects of cultural values and bilateral trade flows. Past research shows that cultural differences have a negative effect on trade between countries (Anderson & Van Wincoop, 2004), however these effects can be offset by large immigrant populations (Tadesse & White, 2008).

Moreover, research specific to Europe and the European institutions, covering cultural values and trade flows is not widely available. Most economists focus on finding relationships around economic integration in the European Union as a result of the European Monetary Union and the European common market (Bun & Klaassen, 2002; Lane, 2006).

The European single market and the EMU have as a goal to completely integrate the different economies of EU countries into one European economy (European Commission, 1990). Since there are no more internal barriers to trade such as physical and administrative borders (Allington, Waldmann, & Kattuman, 2004) as well as a common currency in the EMU countries, these countries should be nearly completely integrated into one market. If this is the case then there should be no evidence for an effect of cultural distance on trade between EMU countries.

On the other hand, Robert Mundell (1961) has argued that high labour mobility is the most important factor for a currency area to succeed. Labour mobility in the EMU is relatively low, especially when compared to labour mobility within the USA (The Economist, 2014). This might be caused by the cultural distance that is still present between EMU countries.

The transaction cost theory has also been used to argue that cultural differences foster trade. Higher cultural differences between countries will increase the transaction costs for multinational firms because of bigger managerial differences (Kogut & Singh, 1988). therefore they will be less likely to expand overseas and more likely to buy the goods from a local firm (Gatignon & Anderson, 1988; Caves, 1996). Linders et al. (2005) indeed found evidence that cultural distance increases the volume of trade between countries, when controlling for formal institutions.

3. Empirical Analysis

3.1 Hypotheses

Summarising all the arguments and theories above, it is expected that a larger cultural distance between European countries reduces the volume of trade between those countries. Next to this, if both countries are members of the EMU, it is expected that there are no effects of cultural distance on trade. Therefore the hypotheses in words are:

$H1$: *Cultural differences between countries decrease the level of bilateral trade*

$H2$: *The negative trade effects of cultural differences are not present between EMU countries because of their close economic integration*

Two variables are used to measure cultural values within countries. The first one is the level of trust/distrust which the people in one country place in their fellow countrymen. The other is the level of individualism versus collectivism among the inhabitants of a country. Both values are measured by questions in the World Values Survey (WVS) and a deeper explanation of their construction as well as an assessment of the validity of the WVS is given in the methodology part of this paper.

3.2 Data

The dependent variable in this analysis is exports in goods from country *i* to country *j* at time *t*. The dataset started with trade data for 32 European countries[1] over the period 1995 to 2014. These

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[1] These countries are: Albania, Armenia, Azerbaijan, Bosnia, Bulgaria, Belarus, Croatia, Cyprus, Czech Rep., Estonia, Finland, France, Georgia, Germany, Great Britain, Hungary, Italy, Latvia, Lithuania, Macedonia, Moldova, the Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland and Ukraine.

observations were obtained from the directions of trade statistics database of the IMF[2]. To measure cultural distance, the variables trust and individualism are used[3].

First of all, trust is widely regarded as an important value needed to facilitate trade (Arrow, 1972; Guiso, Sapienza, Zingales, 2006). Trust is defined as the dependence on another to fulfil an obligation (Ahern, Daminelli, & Fracassi, 2012). In this paper, trust is measured on the country level and the interest is in the difference in trust levels between two trading countries. The independent variable is thus the difference in trust between country *i* and country *j* constructed as

$$Trust\ difference = |Trust_{it} - Trust_{jt}|$$

Secondly, individualism considers the degree to which individuals are integrated in groups (Hofstede, 1989). In individualistic societies it is accepted that agents maximise their self-interest, opposite to collectivist societies where agents sacrifice their self-interest for the benefit of the group (Ahern, Daminelli, & Fracassi, 2012). The level of individualism versus collectivism is one of the dimensions from Hofstede's model for cultural values (Hofstede, 1980). Next to this, it is also one of the seven dimensions in Trompenaars' (1993) model of cultural dimensions and one of the dimensions in the three dimension system of Schwartz (1994). Individualism is also measured at the country level, after which country pairs are compared and the difference in individualism is taken as an explanatory variable for export flows similarly as the level of trust:

$$Individualism\ difference = |Individualism_{it} - Individualism_{jt}|$$

3.3 Measuring cultural values

As stated in the theoretical framework, there is a great challenge in measuring cultural values and believes as this data is highly intangible. This requires extensive field research and surveys, fortunately the World Values Survey (WVS) has been taking surveys since 1981 and since 1990 a survey round has been conducted every four years (World Values Survey Org., 2016). This global project has handed out standardised surveys in over 100 countries to gather information on beliefs values and motivations of people around the world (World Values Survey Org., 2016). Two questions from the WVS are used to measure the levels of trust and individualism in each country, this approach is similar to that of Ahern

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[2] This data can be found at the IMF's website: http://data.imf.org/.
[3] Trust and Individualism are measured by the World Values Survey http://www.worldvaluessurvey.org/.

et al. (2012). Both questions are present in each survey wave from the second wave till the most recent round. To measure trust, the following question is used,

Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?

Only two answers are possible for this question, a respondent can say he generally trusts people or that you need to be careful. To quantify these responses, a zero is given to every respondent that says people can be trusted whereas a one is given when the respondent beliefs that you should be careful. Averaging all responses per country creates a proportion on a scale from zero to one, which indicates how high the level of trust is in a country at the time of the survey. Since the WVS gives zeros to responses that say 'a person can be trusted', a lower score indicates that people trust each other more and a higher score signals distrust. Individualism is measured with the help of the question,

How would you place your views on this scale? 1 means you agree completely with the statement on the left; 10 means you agree completely with the statement on the right; and if your views fall somewhere in between, you can choose any number in between.

The statement on the left says "incomes should be made more equal" and the other statement is "We need larger income differences as incentives for individual effort". These responses can also be quantified in a proportion between zero and one, as they are given on a scale from one to ten. In this case a higher proportion indicates that the citizens of a country are individualistic whereas a lower score tells that the citizens of a country care more about the wellbeing of others.

The maps below give an indication of the trust and individualism levels within countries. Darker red indicates mores distrust versus lighter red for more trusting countries. Next to this, darker blue signals higher values for individualism whereas light blue countries are more collectivist. The year 1999 is taken because this year has the most observations in the sample set. Grey countries on the map were not included in the WVS round corresponding to 1999.

Norway and Sweden are the two countries with the lowest scores for the trust measure on the national level, as stated before, a lower score on this measure indicates more trust within a society. Moldova and Macedonia have the highest scores in 1999, implying that in these countries the people general do not trust each other. Finland and Hungary are the most collectivist countries in this year whereas Georgia and Moldova score the highest scores for individualism. For each of those countries the five largest and five smallest export flows are plotted on the maps to give a first insight of the relationship between cultural distance and export
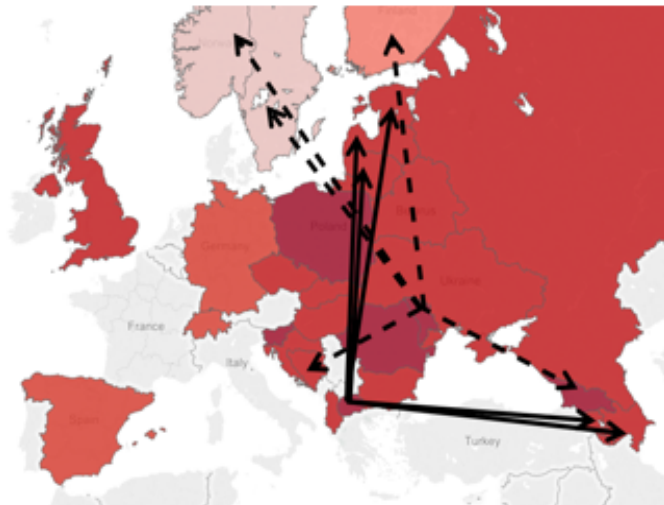
Figure 1. Trust levels and exports in 1999

a) Smallest exports from Norway and Sweden

b) Largest exports from Norway and Sweden

c) Smallest exports from Macedonia and Moldova

d) Largest exports from Macedonia and Moldova

Legend: Trust levels

0.3456   0.9182

Data sources: http://www.worldvaluessurvey.org/ and http://data.imf.org/; Author's illustration.
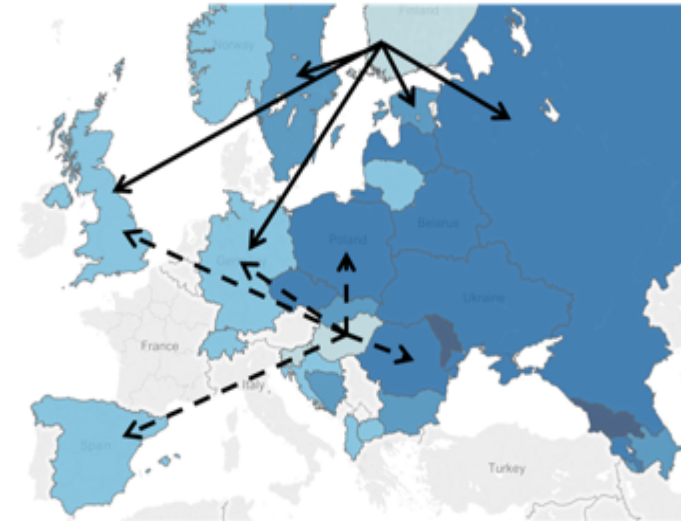
Figure 1. Individualism levels and exports in 1999

a) Smallest exports from Finland and Hungary

b) Largest exports from Finland and Hungary

c) Smallest exports from Georgia and Moldova

d) Largest exports from Georgia and Moldova

Legend: Individualism levels

0.3792   0.7601

Data sources: http://www.worldvaluessurvey.org/ and http://data.imf.org/; Author's illustration.

At a first glance it seems that the largest export flows are going to countries with similar colour shades, thus having similar levels of trust and individualism, and the smallest flows are going to countries with very different colours. Taking a more careful look reveals a few more patterns that cannot be ignored and might offer a different explanation to the flows of exports.

The arrows corresponding to the smallest export flows are often much longer than those corresponding to the largest export flows. This indicates that geographical distance has a large effect on trade flows as well. Moreover, the largest exports are often to countries that have a common border with the exporter. Next to this, Germany and Great Britain are always present as largest export partners for at least one of the countries. These are the largest European economies in terms of gross domestic product (GDP) and also belong to top when considering GDP per capita.

3.4 Control variables

To correctly estimate the effect of cultural distance on the volume of export between countries, it is necessary to account for geographical distance, a common border effect and a country's relative wealth. As well as any other variable that could be related to both cultural distance between the countries and the volume of exports. Otherwise the estimate of the effect of cultural distance will be severely biased. To prevent this bias the following variables are added to the model.

Geographical Distance, data taken from the CEPII database on distance[4]. Measuring the distance in kilometres between the capitals of two countries. If the distance between a country pair is larger, exports between those countries are expected to be lower (Anderson J. E., 2011). Next to this, countries that are further apart from each other are expected to have larger cultural differences.

Exporter and importer real GDP, to control for the market sizes of the countries. Higher real GDP of a country is expected to increase trade flows from and to that country (Anderson J. E., The Gravity Model, 2011).

Next to this, *exporter and importer real GDP per capita,* are added to control for the fact that large economies are not necessarily more wealthy on the individual level. Higher GDP per capita is found to have a positive effect on trade (Rose A. K., 2000). Data for real GDP and GDP per capita is taken from the Penn World Tables 8.1[5].

Exporter and importer openness to trade, which is defined as the sum of a country's imports and exports divided by its GDP. This is to account for the fact that some countries are more open to trade than others. When a country is more open to trade, exports from that country are expected to be

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[4] This database is called Geodist: http://www.cepii.fr/CEPII/en/.
[5] Penn World Tables are available at the website of the University of Groningen: http://www.rug.nl/.

higher as the country has a larger share in international trade than its GDP alone would suggest. This data is also found in the Penn World Tables 8.1.

A set of dummy variables is created that take the value of one when a country pair shares a formal cultural institution. Firstly *a common primary language* which has been found to promote trade (Melitz, 2008).

Secondly *a common primary religion* as it has been shown that religion affects both economic decision making as well as trust levels within a nation (Guiso, Sapienza, & Zingales, 2003). Primary religion is defined as a country's most practised religion and they are classified as either catholic, orthodox, protestant Christian or Islam.

Lastly these dummy variables control for *a common legal origin*. The legal systems of countries are classified as either French civil law, German civil law, Nordic civil law or English common law. Sharing the same legal origin often results in more complete contracts thus reducing noise and transaction costs for business between these countries (La Porta, López de Silanes, Shleifer, & Vishny, 1998). The data for these three variables is taken from the CIA world fact book[6].

Dummy variables are also used to control for *a common border* between two trading countries. This is added because geographical distance measured in kilometres is not always a good measure to capture the distance between two countries (Anderson J. E., The Gravity Model, 2011). For example, Berlin is much further away from Amsterdam than Paris is. However exports from the Netherlands to Germany have always been larger in volume than exports from the Netherlands to France, because the Netherlands and Germany are neighbouring countries. Also, countries sharing a border are likely to share more cultural values.

Lastly, two dummy variables are added recording if both countries *are part of the Eurozone* or if countries have *signed a bilateral trade agreement*. Free trade agreements and a common currency are expected to increase the level of trade between countries (Rose A. K., 2000; Rose & Van Wincoop, 2001).

Table one lists the descriptive statistics for all the variables in the dataset. Histograms for exports, trust and individualism (see appendix) show that these data series are very skewed. Taking the natural logarithm of the variables reduces the skewness and has several methodological advantages that are explained in the next section.

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[6] The World Fact Book is published at the website of the CIA: https://www.cia.gov/.

Table 1. descriptive statistics					
Variable	Mean	Median	Maximum	Minimum	Standard Deviation
ln(Exports in US$)	18.206	18.407	25.875	3.912	3.384
ln(1 + ΔTrust)	0.140	0.099	0.514	0.000	0.121
ln(1+ ΔIndividualism)	0.099	0.090	0.323	0.000	0.067
ln(Distance between capitals in KM)	7.162	7.271	8.405	4.394	0.632
ln(Exporter openness in percentages)	4.406	4.393	5.149	3.766	0.328
ln(Importer openness in percentages)	4.406	4.393	5.149	3.766	0.329
ln(Exporter RGDP in US$)	25.811	26.043	28.891	22.662	1.759
ln(Exporter RGDP per capita in US$)	9.678	9.762	11.094	7.490	0.868
ln(Importer RGDP in US$)	25.812	26.043	28.891	22.662	1.758
ln(Importer RGDP per capita in US$)	9.679	9.762	11.094	7.490	0.867
Common language	0.009	0	1	0	0.093
Common religion	0.276	0	1	0	0.447
Common legal origin	0.429	0	1	0	0.495
Both ERM members	0.061	0	1	0	0.240
Common border	0.117	0	1	0	0.321
FTA	0.415	0	1	0	0.493

4. Methodology

Equation 2.2 which was the basic gravity equation to estimate the exports between a country pair is a Cobb-Douglas function and taking the natural logarithms on both sides transforms this in the log-linear function stated below

$$\ln(Exports_{i,j,t}) = \alpha_0 + \alpha_t + \alpha_i + \alpha_j + \gamma_1 \ln(1 + \Delta trust_{i,j,t})$$
$$+ \gamma_2 \ln(1 + \Delta Individualism_{i,j,t}) + V_{i,j,t} \tag{4.1}$$

The RHS consists of three terms. First the natural logarithm of one plus the difference in trust between countries i and j at point t in time. Secondly the natural logarithm of one plus the difference in individualism levels between countries i and j at point t in time. Note that these variables are distributed between zero and one, taking the natural logarithm would give negative values, therefore the natural logarithm is taken of one plus the difference.

$V_{i,j,t}$ is the vector of control variables that were listed in the data section. This vector is defined as

$$V_{i,j,t} = \beta_1 \ln(Openness_{i,t}) + \beta_2 \ln(Openness_{j,t}) + \beta_3 \ln(realGDP_{i,t}) + \beta_4 \ln(realGDP_{j,t})$$
$$+ \beta_5 \ln\left(\frac{realGDP}{capita}_{i,t}\right) + \beta_6 \ln\left(\frac{realGDP}{capita}_{j,t}\right) + \beta_7 \ln(GeoDist_{i,j,t})$$
$$+ \beta_8 commonBorder_{i,j,t} + \beta_9 commonLanguage_{i,j,t} + \beta_{10} commonReligion_{i,j,t}$$
$$+ \beta_{11} commonLegalOrigin_{i,j,t} + \beta_{12} Eurozone_{i,j,t} + \beta_{13} FTA_{i,j,t}$$
$$\tag{4.2}$$

The Subscripts on the RHS indicate whether the variable applies to the exporting country i, the importing country j, or for the country pair i,j at point t in time.

Another advantage of taking the natural logarithms is that it converts the changes in variables into percentage changes (Stock & Watson, 2015). Taking the natural logarithm on both sides thus converts variable changes into elasticities. The coefficient of a variable gives the percentage change in exports for a one percentage change of the dependent variable.

4.1 Panel data specific terms

To deal with the effect of unobserved variables in the panel data set, four more terms need to be specified. First of all, a constant α_0. To capture the effect of any fluctuations of or shocks to the business cycle, a time dependent term will be added that is the same for all country-pairs in the dataset. This term will be denoted α_t.

For the time invariant but country specific effects there are two options when estimating a gravity equation. Firstly, a country specific term can be added for the exporting country and one for the importing country. On the other hand, a single country-pair dummy can be used. This comes with less restrictions than two separate terms for each country and does equally well in capturing the time invariant effects (Wall & Cheng, 1999; Egger & Pfaffermayr, 2003). However, this method is not fit for this particular paper, as a country-pair dummy would also include any cross-sectional effect of cultural differences (Ahern, Daminelli, & Fracassi, 2012). Which is, of course, the interest of this paper. Hence, a dummy for both the exporter and the importer is added.

To test the second hypothesis, interaction effects are added between the values measuring cultural distance and the dummies for Eurozone membership. If the second hypothesis is true, these coefficients should be positive. As the hypothesis is that the overall effect of cultural distance on trade flows between Euro countries is zero, therefore γ_1 should be cancelled out by γ_3 and γ_2 should be cancelled out by γ_4. The gravity equation is as follows,

$$\ln\left(Exports_{i,j,t}\right) = \alpha_0 + \alpha_t + \alpha_i + \alpha_j + \gamma_1 \ln\left(1 + \Delta trust_{i,j,t}\right)$$
$$+ \gamma_2 \ ln\left(1 + \Delta Individualism_{i,j,t}\right) + \gamma_3 \ Eurozone * \ln\left(1 + \Delta trust_{i,j,t}\right)$$
$$+ \gamma_4 Eurozone * \ln(\Delta Individualism_{i,j,t}) + V_{i,j,t} + \mu_{i,j,t} \qquad (4.3)$$

Where $\mu_{i,j,t}$ represents a normally distributed error term with $E\left(\mu_{i,j,t}\right) = 0$. Rewriting the hypotheses from the theoretical framework to testable equations gives

$H_0: \gamma_1 = 0$	$H_0: y_2 = 0$	$H_0: \gamma_3 = 0$	$H_0: \gamma_4 = 0$
$H_a: \gamma_1 < 0$	$H_a: y_2 < 0$	$H_a: \gamma_3 > 0$	$H_a: \gamma_4 > 0$

Equation 4.3 will be estimated with ordinary least squares (OLS) regression. This allows to test the above stated four hypotheses

4.2 Econometric problems and proposed solutions

Various problems could arise when estimating equation 4.3 with OLS regression. These problems can be divided into two broad groups. Namely problems related to using cultural distance as an explanatory variable and problems violating the assumptions of OLS regression.

Shenkar (2001) poses various possible problems when using cultural distance as an explanatory variable. Firstly, because cultural distance is measured as the difference between two countries' respective levels of trust and individualism it creates a false sense of illusion (Shenkar, 2001). Country-pair *ij* will have the same cultural distance as pair *ji*. This suggests that for example Dutch exporters exporting to Poland are faced with the same cultural problems as Polish exporters exporting to the Netherlands. There are no studies that show symmetry in cultural distance and there is no reason to assume cultural distance is symmetrical (Shenkar, 2001). To overcome this problem, section six will offer an alternative approach in which asymmetrical affinity with a country will be proxied by the amount of tourists visiting that country.

Secondly, in most academic papers on cultural distance, cultural values are measured at one point in time. Most works thus implicitly and falsely assume cultural distance between countries to be constant over time (Shenkar, 2001). Webber (1969) proposes that cultural distance between countries closes as countries do more business with each other and business agents get accustomed to each other's values. The WVS provides data over a timespan of more than twenty years in waves of four years. Export flows are matched to the closest observation of a nation's cultural values by the WVS. Unfortunately the WVS data is not stable over time, more and more countries are surveyed in later rounds whereas the earlier rounds include fewer countries. As a result, some trade flows are matched to WVS results from as much as eighteen years earlier. Any difference larger than four years between trade data and the data from the WVS is removed to prevent the false assumption of stability for cultural distance.

Many researches use an aggregate form of cultural distance in which two or more cultural values are summed according to a weighted average (Kogut & Singh, 1988; Linders, Slangen, De Groot, & Beugelsdijk, 2005). However it is unsure what the exact effects of different cultural dimensions are before testing them, making a false assumption of equivalence (Shenkar, 2001). Hofstede (1989) already proposed that differences along some cultural dimensions are more disrupting than others. The OLS regression performed in this paper therefore considers both trust differences and differences in individualism as separate independent variables.

Lastly Shenkar (2001) notices that a balanced analysis should also consider cultural similarities. As explained in the data section, this paper controls for similarities in cultural institutions as they will likely bias the coefficient of cultural distance when they are not included.

The main concern regarding the assumptions of OLS is that there is possible heteroscedasticity and/or autocorrelation in the error terms of the OLS estimate. It appears highly likely that the error terms for each country pair are correlated trough time. The error times might as well depend partially on certain country-pair specific variables.

The residual plot below for example shows a tendency for the errors to get larger when the distance between two countries increases. Indeed both the Breusch-Pagan test and White's test for homoscedasticity reject the hypothesis that the variance is constant and does not depend on any of the independent variables. To address this problem, the standard deviations of the regressions will be clustered on the country-pairs.

Figure 3: Residual plot of model 1
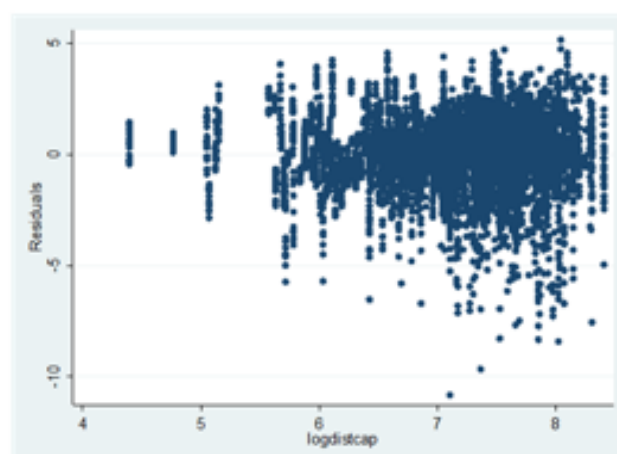
4.3 Validity of the World Values Survey

Using the responses from the WVS to measure the independent variables Trust and Individualism can bias the results when the WVS is not well designed. Biases can for example arise when the results from the WVS do not accurately reflect the cultural values and beliefs within the countries that are surveyed.

To assess whether this bias exists or not, various researches have tested if the responses to the WVS can predict behaviour in experimental settings. It has been found that trust as measured by the WVS is a good predictor of trust in experiments with US citizens (Glaeser, Laibson, Scheinkman, & Soutter, 2000) as well as German and Swedish participants (Fehr, Fischbacher , von Rosenbladt, Schupp, & Wagner, 2002; Holm & Danielson, 2005). Next to this, the same patterns of cultural dimensions are found when using the WVS as well as Hofstede's original dataset from the IBM survey (Minkov & Hofstede, 2010). These result give evidence that the WVS accurately reflects the cultural values and beliefs in the surveyed country.

5. Results

Table 2. OLS regression results						
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
log(1 + ΔTrust)			-0.515907		-0.5021396	*-0.6054386
			(0.353)		(0.353)	(0.369)
log(1+ ΔIndividualism)				*-0.6898972	*-0.6742454	*-0.6373952
				(0.368)	(0.369)	(0.387)
log(1 + ΔTrust)*Both ERM Members						1.09253
						*(0.661)
log(1+ ΔIndividualism)*Both ERM Members						-0.4432655
						(1.151)
log(Distance between capitals)	***-1.334297	***-1.798501	***-1.780995	***-1.796825	***-1.779824	***-1.777987
	(0.027)	(0.090)	(0.090)	(0.090)	(0.091)	(0.090)
log(Exporter openness)	***1.514251	**0.338479	**0.3259039	**0.3218812	*0.3100182	*0.3055218
	(0.051)	(0.159)	(0.159)	(0.159)	(0.159)	(0.159)
log(Importer openness)	***0.1511786	0.1939687	0.1819278	0.1746096	0.1633291	0.1589779
	(0.051)	(0.149)	(0.149)	(0.150)	(0.150)	(0.150)
log(Exporter RGDP)	***1.301918	-1.210229	-1.239183	-1.164319	-1.193542	-1.218995
	(0.013)	(0.870)	(0.866)	(0.868)	(0.864)	(0.865)
log(Exporter RGDP per capita)	***0.3513128	***2.007644	***2.04565	***1.967812	***2.005708	***2.037934
	(0.024)	(0.735)	(0.733)	(0.733)	(0.730)	(0.732)
log(Importer RGDP)	***0.8774782	-0.2946075	-0.321621	-0.2445866	-0.272014	-0.2975636
	(0.013)	(0.641)	(0.641)	(0.639)	(0.639)	(0.640)
log(Importer RGDP per capita)	0.0162532	**1.271424	**1.30649	**1.22577	**1.260935	**1.292996
	(0.024)	(0.624)	(0.624)	(0.622)	(0.621)	(0.623)
Common language	*0.2932466	*0.3826045	*0.3639169	*0.3572983	*0.3396835	0.3271805
	(0.154)	(0.197)	(0.199)	(0.204)	(0.206)	(0.206)
Common religion	***0.3162243	0.0131571	0.0076324	0.0156408	0.0102072	0.008314
	(0.033)	(0.078)	(0.078)	(0.078)	(0.078)	(0.078)
Common legal origin	***0.2297016	***0.2968366	***0.2832552	***0.2964573	***0.2832469	***0.2754974
	(0.031)	(0.075)	(0.075)	(0.075)	(0.075)	(0.077)
Both ERM members	***0.4943563	-0.0218775	-0.0173288	-0.0265383	-0.0220053	-0.1700829
	(0.061)	(0.124)	(0.123)	(0.123)	(0.123)	(0.170)
Common border	***0.611156	*0.2131162	*0.2124987	*0.21241	*0.211825	*0.2180261
	(0.053)	(0.126)	(0.125)	(0.126)	(0.124)	(0.124)
FTA	***0.7990038	***0.8953266	***0.8941869	***0.8827208	***0.8818975	***0.8820315
	(0.033)	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)
N	9651	9651	9651	9651	9651	9651
R-squared	0.8376	0.8811	0.8813	0.8813	0.8814	0.8815
Time, Importer and Exporter fixed effects	No	Yes	Yes	Yes	Yes	Yes
Standard Errors clustered on Country-pairs	No	Yes	Yes	Yes	Yes	Yes
* P<0.10, ** P<0.05, *** P<0.01						

Table two lists the output for the OLS regressions performed to estimate equation 4.3 the dependent variable in all these regressions is the volume of exports. The first model is a benchmark to test for heteroscedasticity and to see how the coefficients change when fixed effects are added. Model two is a benchmark model, including fixed effects and clustered standard errors, to compare the models three to six with. Model six is the complete estimate of equation 4.3. The signs of all the control variables are as predicted except for exporter and importer real GDP as well as the dummy for Eurozone countries, however these coefficients are not significantly different from zero.

In all regressions that include trust and individualism differences, they have negative coefficients. However trust is only statistically significant at the ten percent level in the final model, when

interactions between cultural distance and Eurozone membership are included. The effect of individualism on the other hand is statistically significant at the ten percent level in all models and only varies slightly when other terms are added. These negative effects on trade are also obtained by Tadesse and White (2008), who found cultural distance to decrease trade in homogenous goods as well as culturally differentiated goods. Felbermayr and Toubal (2010) conclude that culturally close countries trade more in differentiated goods than countries that are culturally more distant.

According to the final model, a one percent increase of the individualism level difference between two countries reduces exports by 0.63 percent. Next to this, a one percent increase in the level of trust differences lowers exports between those countries by 0.6 percent.

However when both countries are Eurozone countries this negative effect is offset by the interaction effect between the trust difference and Eurozone membership, implying that Eurozone countries' export flows increase by 0.48 percent when trust differences increase by one percent. A Wald-test is used to test if the sum of coefficients one and three is significantly different from zero. This test rejects the null hypothesis that their sum is equal to zero in favour of the alternative hypothesis that the sum of coefficients one and three is larger than zero.

The interaction effect for individualism differences and Eurozone membership is not significantly different from zero. This implies that trade between Eurozone countries is affected as much by differences in individualism as trade between non-Eurozone countries.

Adding cultural differences to the model hardly improves the R-squared compared to the benchmark model. Signalling that cultural distance only explains a very small part of variations in trade flows between countries.

Table three lists the variance inflation factors in the estimate of model 6. High variance inflation factors indicate problems of multicollinearity in the regression. Multicollinearity arises when two or more variables are highly correlated (Stock & Watson, 2015). This makes it impossible to estimate separate effects for these variables within the same regression. The highest variance inflation factor is for the Eurozone dummy which is not surprising as this is also included in the interaction effect with both trust and individualism. Furthermore all variance inflation factors are well below the threshold of ten which is generally used.

Table 3. Variance inflation factors	
	VIF
log(1 + ΔTrust)	3.09
log(1+ ΔIndividualism)	1.43
log(Distance between capitals)	2.96
Common language	1.17
Common religion	1.38
Common legal origin	1.88
Both ERM members	6.33
Common border	1.88
FTA	1.89

6. Alternative approach

To address the problem of similarity that Shenkar (2001) defined, tourism flows between countries are added. Tourism is measured as the total number of nights spend by citizens from country j in country i at time t. These numbers are obtained from the Eurostat database [7]and their biggest disadvantage is that they are mostly only available for citizens departing from EU member countries. This reduces the sample size significantly, hence the output is not directly comparable with the output in table two.

Tourism flows give more information about the cultural proximity between two countries than the standard cultural indicators language, religion and common legal system as well as the differences in trust and individualism. Firstly because it is an indication of the affinity that the citizens from country j have for country i and quite possibly also the products of that country. Therefore we expect tourism to have a positive effect on exports.

The perceptions that people have about other countries change very often. For example, because of recent bombings and the refugee crisis, a lot of tourists are avoiding Turkey and Greece this year and instead go to destinations in Spain and Portugal (Algemeen Dagblad, 2016). The other cultural variables are all country level statistics that tell nothing about the changing attitude of one countries citizens towards the other country.

Moreover tourism flows between countries are asymmetric, as said in the methodology section, the problems that a Dutch trader overcomes when trading with Poland do not have to be the same as the problems that a Polish trader has to overcome when trading with the Netherlands. Tourism flows are able to give an indication of the affinity that citizens have with another country without this affinity having to be reciprocal.

Table four lists the variance inflation factors for OLS regressions including the tourism flows between countries. Due to the reduced sample size, there is not enough variation within certain variables which gives rise to collinearity problems. Therefore the common language dummy is dropped, as well as the interaction effects. Table five gives the output for OLS regressions including tourism.

Table 4. Variance inflation factors	
Variable	VIF
logTourism	6.14
log(1 + ΔTrust)	2.35
log(1 + ΔIndividualism)	1.64
log(Distance between capitals)	3.8
Common language	27.95
Common religion	1.45
Common legal origin	1.58
Both ERM members	3.1
Common border	1.96
FTA	7.54

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[7] Tourismdata is found under the header 'number of tourist nights' http://ec.europa.eu/eurostat/web/tourism/.

Table 5. OLS regression results including tourism					
Variables	Model 1	Model 2	Model 3	Model 4	Model 5
log(Touristsnights from Importer in Exporter)	***0.1480737				***0.1448706
	(0.051)				(0.050)
log(1 + ΔTrust)		*-0.5917543		*-0.5966165	*-0.5895693
		(0.358)		(0.357)	(0.352)
log(1+ ΔIndividualism)			**-0.8917353	**-0.9034357	*-0.7639681
			(0.445)	(0.445)	(0.428)
log(Distance between capitals)	***-0.9111787	***-1.040939	***-1.076185	***-1.045714	***-0.8887139
	(0.128)	(0.119)	(0.12)	(0.120)	(0.126)
log(Exporter openness)	***1.212111	***1.240498	***1.272444	***1.268468	***1.232212
	(0.293)	(0.292)	(0.296)	(0.293)	(0.293)
log(Importer openness)	0.1704153	0.0833124	0.0673709	0.0479231	0.1203762
	(0.352)	(0.378)	(0.372)	(0.373)	(0.346)
log(Exporter RGDP)	-0.3124409	-1.197841	-0.9101314	-1.074137	-0.3859607
	(1.690)	(1.808)	(1.769)	(1.774)	(1.677)
log(Exporter RGDP per capita)	1.896696	*2.835078	2.526478	2.667318	1.912418
	(1.541)	(1.648)	(1.618)	(1.623)	(1.535)
log(Importer RGDP)	-0.6203619	0.1304953	0.4246482	0.384008	-0.4319068
	(1.447)	(1.342)	(1.364)	(1.352)	(1.447)
log(Importer RGDP per capita)	1.564585	0.8967646	0.6221267	0.7063191	1.472281
	(1.276)	(1.151)	(1.173)	(1.157)	(1.266)
Common religion	***0.2322888	**0.2143778	***0.2385534	**0.2102324	**0.201261
	(0.086)	(0.094)	(0.088)	(0.093)	(0.089)
Common legal origin	0.0847864	0.069396	0.0926807	0.0646208	0.0535389
	(0.098)	(0.107)	(0.105)	(0.104)	(0.097)
Both ERM members	0.1415531	0.1053737	0.0848287	0.102605	0.1555278
	(0.117)	(0.119)	(0.120)	(0.119)	(0.117)
Common border	*0.2625135	**0.2963532	**0.3309647	**0.3108687	*0.2560487
	(0.0136)	(0.139)	(0.137)	(0.135)	(0.131)
FTA	0.1020046	0.1944201	0.2126469	0.1902603	0.0790479
	(0.170)	(0.167)	(0.160)	(0.165)	(0.172)
N	1241	1241	1241	1241	1241
R-squared	0.9440	0.9419	0.9417	0.9423	0.9449
Time, Importer and Exporter fixed effects	Yes	Yes	Yes	Yes	Yes
Standard Errors clustered on Country-pairs	Yes	Yes	Yes	Yes	Yes
* P<0.10, ** P<0.05, *** P<0.01					

The results including tourism largely confirm what the regressions with the main data set already stated. Differences in trust and individualism levels decrease the dependent variable, the amount of exports between a country pair, also when controlling for the asymmetric affinity that citizens of a country might have for another country. Next to this tourism has a positive effect on trade which is statistically significant at the one percent level.

7. Summary and Conclusion

This paper extended the basic gravity equation to include measures of cultural distance between countries. Cultural distance arises trough differences in values and believes between different groups of people. The hypothesis was that higher cultural distance between countries reduces the exports between those countries because they increase transaction costs through a wide range of economic phenomena.

Next to this it was argued that the effects of cultural distance are smaller for countries that participate in the European Monetary Union. As the aim of this project is the complete integration of the national markets into a single European market. Since all EMU members are also part of the Schengen area, there are no internal barriers to trade.

Some theorists have argued however that higher cultural distance could actually lead to substituting away from overseas expansion towards importing goods from those countries, thus increasing trade flows. Linders et al. (2005) seemed to confirm this hypothesis, however they use an aggregate construct for cultural distance which has been criticised because not all cultural values have the same effects (Shenkar, 2001). Besides this specification problem of cultural distance there are more potential problems that this paper tried to overcome.

There may be many formal cultural institutions that affect both trade flows and cultural values, thus biasing the effect of cultural distance when they are not controlled for. Longitudinal data from the World Values Survey on cultural values is used to correct for the fact that cultural values might change over time. Lastly tourism data is added in an extension to the basic regressions in order to provide an asymmetrical measure of the cultural affinity from one country towards another, as data on cultural distance is by default symmetrical.

Equation 4.3 is fully estimated by model six in table two and based on that output, three out of four of the null hypotheses can be rejected in favour of the alternative hypotheses at the ten percent level. Differences in trust and individualism both have negative effects on the exports between countries. Moreover the coefficient of the interaction term between trust differences and membership of the EMU has a positive coefficient that is significantly different from zero at the ten percent level as well. The only null hypotheses that cannot be rejected is that the coefficient of the interaction effect between individualism differences and membership of the Eurozone is equal to zero.

When comparing the different regressions in table two with each other, it is striking to notice how constant all the coefficients are across regression two until six. Not only do the variables of interest just change mildly when another variable is added, also the control variables have very stable coefficients.

A remark should be made that the effect of trust is only significant in model six, which represents equation 4.3. This is probably influenced by the fact that EMU countries suffer much less from differences in trust levels, a distinction that is only made in the last model. The effect of individualism differences on trade flows is always significant at the ten percent level. There is also no statistically significant different effect for Eurozone countries with respect to individualism.

When the sample is changed to include tourism flows between countries, the results again provide evidence at the ten percent level for the hypothesis that a higher cultural distance reduces trade between countries. Tourism is used as a measure to indicate the affinity that citizens from a country may have towards another country. Evidence is found for tourism to have a positive effect on exports which is significant at the one percent level. This should not be interpreted as evidence that tourists actually increase exports in goods. In this case tourism merely acts as a measurement of the affinity towards a country. Cultural proximity/distance is a function of the cultural institutions that are present in countries as well as the way that agents perceive the other cultural through the personal information they have.

The research question proposed in the introduction was

What are the effects of cultural distance on trade between European countries?

Considering all findings this can be answered by stating that differences in cultural values have a negative effect on trade between European countries. However it is hard to find a different effect for EMU countries than for other European countries. Trust difference seem not to reduce trade among EMU trade partners but no evidence is found for individualism differences between EMU countries to have a similar effect. This hypothesis could also not be tested in the additional model with tourism flows, making the evidence around this sub question inconclusive.

To place the effects of cultural distance into context the following should be considered. The OLS estimate with the main data set found that the combined effect of a one percent increase in both trust and individualism differences would be to reduce exports by 1.23 percent. Whereas a one percent increase in importer real GDP per capita increases exports to that country by 1.29 percent. Considering that real GDP per capita growth in most western European countries has hovered around one percent in recent years and has been negative during the crisis, it is highly unlikely that this will be a main driver of trade in the coming years. However, slightly decreasing the cultural gap between countries could promote trade just as well as a one percent increase in real GDP per capita.

Moreover reducing both the trust and individualism differences between Greece and the Netherlands by just one percent would have the same effect on trade as moving Amsterdam 148 kilometres closer to Athens.

7.1 Recommendations

It would be beyond the scope of this paper to answer the question why differences in trust levels and individualism levels between countries have different effects. And why EMU countries do not seem to suffer from differences in trust but still do from differences in individualism levels. This is therefore the first recommendation for future research based on the findings in this paper. An interesting and related question is also whether there is a difference for countries that joined the EMU from the beginning and those that only joined later. It would be expected that the effects of cultural distance do not change overnight as soon as a country joins the EMU, but that agents gradually adapt to the reality of a common integrated market, thus overtime reducing the effects of cultural distance.

Looking from this perspective it is important to note that the countries that founded the EMU were already close in terms of cultural distance. All of them being western European countries. Whereas those who joined later where more culturally different, five of them have been former Soviet Union states. Therefore this reduced effect of trust differences could be highly driven by the western European founders of the EMU who also tend to be the largest in size of GDP. This would reduce the validity of these findings for the countries that joined later and would be an important extension for future research.

Tourism has been included to offer an asymmetric alternative for the measure of cultural distance/proximity. However this lacks a proper theoretical foundation as well as empirical evidence that tourists spent more time in culturally close countries. Most research on tourism and trade has focussed on the long term benefits of tourism for economic growth. It is however an interesting alternative to for example the study of Felbermayr and Toubal (2010) who estimated cultural affinity by the votes that countries gave each other during the Eurovision song contest.

The last recommendation for future research is to incorporate more cultural values as explanatory variables. For example an analysis with data on all five dimensions of Hofstede's model of culture in combination with an asymmetric measure of culture affinity. This could provide answers to questions such as how different cultural values affect trade differently and moreover which cultural differences cause friction when doing business and which don't.

Next to this, policy makers might also consider the results given by this paper. It adds on top of the growing amount of literature that recognise cultural distance to have a negative effect on trade. European policy makers that would like to integrate the common market even further could focus on reducing the differences in values and beliefs between the various nations within the EU. Or at least try to increase the affinity that citizens from one European country feel towards other European citizens.

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9. Appendix

Graph 1: Distribution of exports
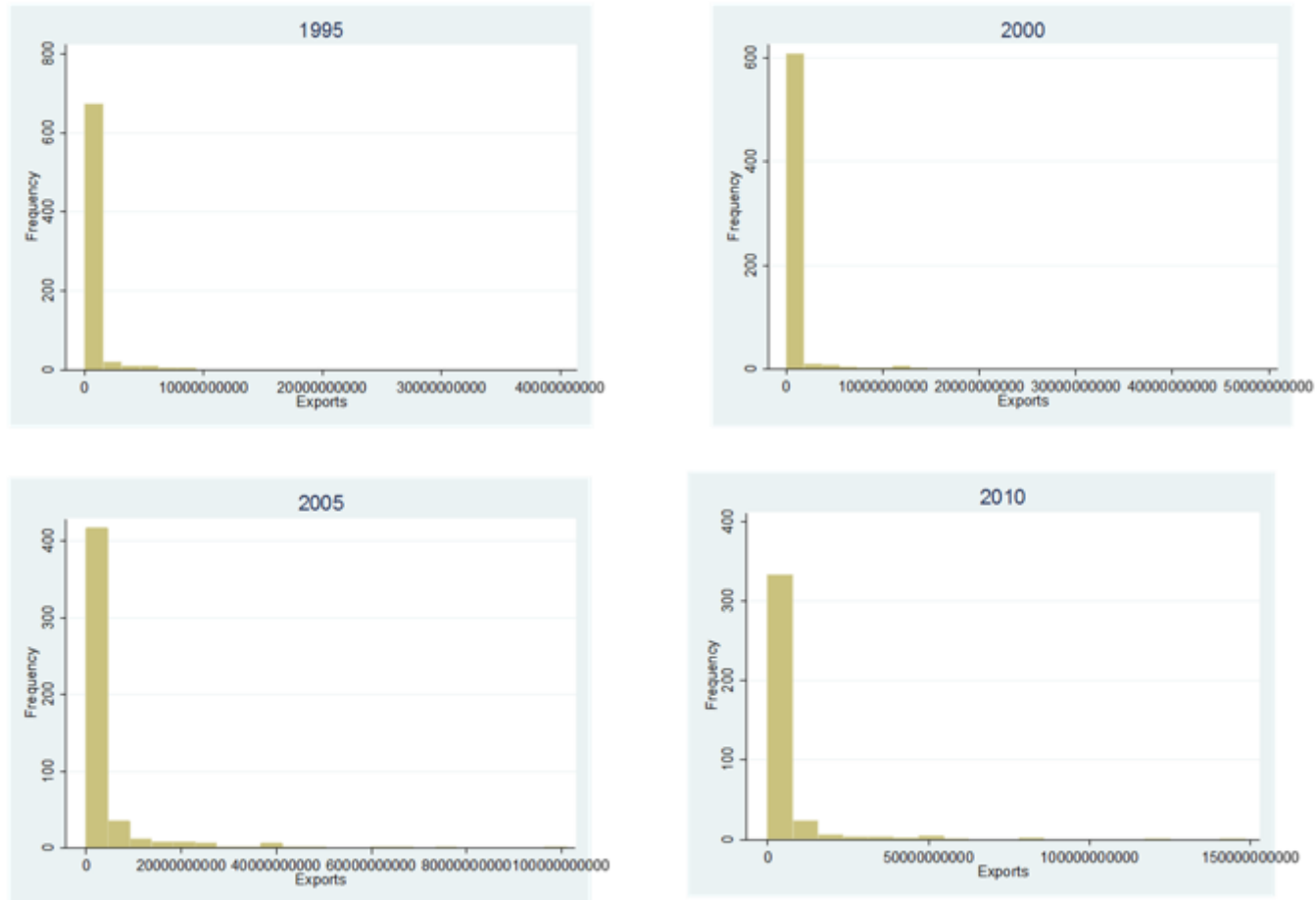
Graph 2: Distribution of trust levels
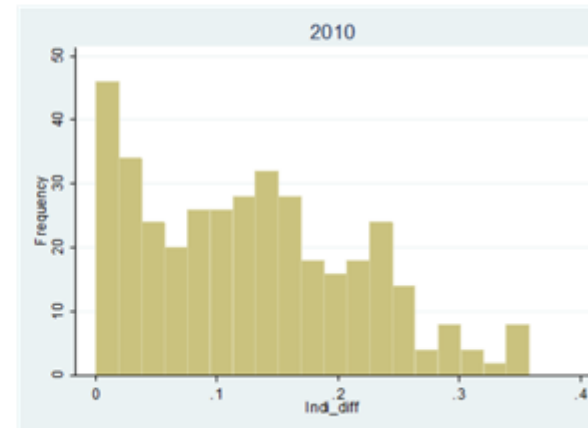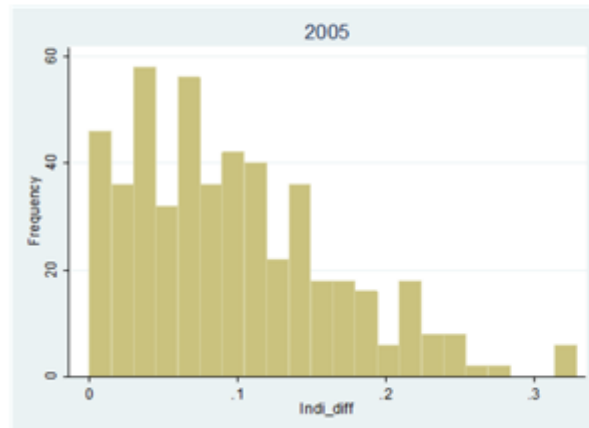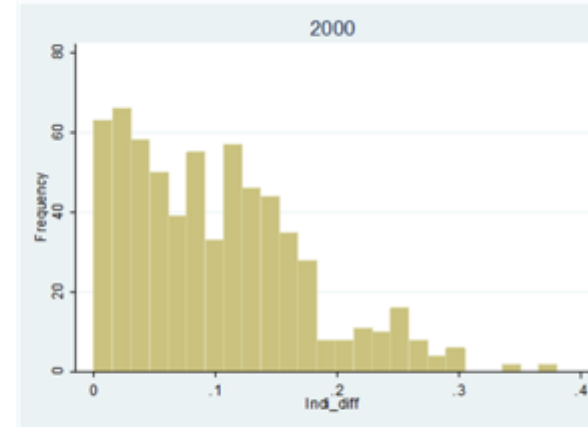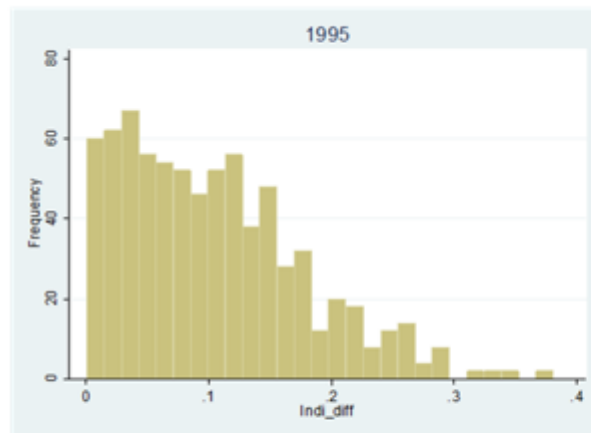
Graph 3: Distribution of individualism levels