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Five Different Measures of Cultural Distance and Bilateral Trade in Services

Master Thesis

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Abstract

This thesis investigates the effect of five different measures of cultural distance on the level of bilateral trade in services between two countries. To guide this research the following research question is proposed: how do different measures of cultural distance affect the level of bilateral trade in services between countries? Previous studies have mostly reported a negative effect of cultural distance on the intensity of trade between two nations, using varying measures of cultural distance. A PPML estimator is applied to estimate the gravity equation, in combination with panel data and fixed effects for countries and time. A set of different specifications is used in which the measures of cultural distance are individually employed as well as in combination with each other. The results indicate that the estimate for cultural distance depends strongly on the measure that is applied. The measures based on the Hofstede dimensions report a strong negative effect, while the estimates for the Inglehart-Welzel measures are ambiguous and very small in magnitude. In addition, the cultural distance measure developed by Kaasa et al. (2016) shows, in contrast to the other measures, a positive effect of cultural distance on trade in services. Overall, it seems that the estimates are very sensitive to the measure of cultural distance that is chosen, the sample that is used, and the type of data that is employed.

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1. Introduction

International trade is essential to national economies and the aggregate world economy. In addition, trade is crucial to the development and growth of countries (van den Berg et al., 2008; Balassa, 1989). This instigates an interest in investigating the (intangible) barriers to trade among scholars. For this purpose, the gravity model was developed, which has been proven to be highly successful in empirically explaining bilateral trade flows (Kandogan, 2016). The gravity equation is used to show the direct positive effect of the economic size of two nations on their bilateral trade flows, and the inverse relation of the (geographical) distance between countries on their bilateral trade (Tinbergen, 1962; Egger & Pfaffermayr, 2003; Baier & Bergstrand, 2007; Head & Mayer, 2014;). The literature emphasizes that panel data and the inclusion of fixed effects may improve the estimation, that zero-flow may be very informative, and that geographical distance is not the only valuable type of distance that should be considered (De Benedictis & Taglioni, 2011; Deardorff, 2014). The latter considers institutional distance, cultural distance, and other intangible barriers. Cultural distance is defined as the degree to which standard norms and values diverge between two nations (Hofstede, 2001; Guiso et al., 2009; Kaasa et al., 2016). Generally, cultural distance is believed to negatively affect the bilateral trade volume between two entities, due to increased transaction costs (Obstfeld & Rogoff, 2000; Tadesse & White, 2010b). This trade-inhibiting impact of cultural distance is expected to be more pronounced for the trade in services, which is more sensitive to failures in communication (Harms & Shuvalova, 2020).

Various measures of cultural distance are proposed in literature, which differ in the concept of culture that is applied and the method of calculation that is used. Firstly, the most prominent measure of cultural distance is developed by Kogut & Singh (1988), who bring forward an index based on the four (or six) cultural dimensions proposed by Hofstede, which originally used data collected from IBM surveys.[1] These dimensions include uncertainty avoidance, individualism, power distance, and masculinity versus femininity. Later, using data from World Value Surveys (WVS), two additional dimensions were included: long-term orientation and indulgence versus restraint. Secondly, Tadesse & White (2010a; 2010b) use the two dimensions from the Inglehart-Welzel map to construct a measure of cultural distance. This map locates countries based on traditional versus secular-rational values (TSR) and survival versus self-expression values (SSE) (Welzel, 2013; Beugelsdijk & Welzel, 2018). The values of this map were constructed using questions from various waves of the WVS. Thirdly, Kaasa et al. (2014; 2016) propose a relatively new dataset measuring cultural distance using the European Social Survey (ESS) and the European Value Survey (EVS), based on the four original Hofstede dimensions. The authors strive to develop an index that considers some of the limitations that are expressed about the measure by Kogut & Singh. Using these various measures of cultural distance, most studies report a significant negative effect of cultural distance on the level of bilateral trade (in services). However, some inconsistency still exists in these findings. This emphasizes the need to investigate the difference in findings on the relationship between various measures of cultural distance and bilateral trade flows, in an otherwise identical regression specification. Therefore, the proposed research question of this study is: how do different measures of cultural distance affect the level of bilateral trade in services between countries? This study aims to investigate whether the various measures of cultural distance offer different estimates in relation to bilateral trade in services, e.g. financial services, government services, and transport.[2]

For this study data are collected on country scores for different cultural dimensions. In addition, data are collected on important control variables. To investigate this research question the gravity equation

[1] IBM: International Business Machines Corporation.
[2] Table A3 (Appendix A) provides a list of which service categories are included.

will be estimated by applying five measures of cultural distance. The frameworks developed by Hofstede and Inglehart-Welzel are both used in combination with two different methodologies, developed by Kogut & Singh and Tadesse & White, to construct four measures of cultural distance. The fifth measure of cultural distance is the index developed by Kaasa et al. (2016), based on the ESS and EVS. In addition, the cultural distance measures will be combined in some of the regression specifications. The empirical analysis applies Poisson pseudo-maximum likelihood (PPML) as the main method of estimation. This will be applied using cross-sectional and panel data, also using fixed effects.

To guide the empirical analysis a set of hypotheses is proposed. First, it is expected that a negative relationship is found between cultural distance and bilateral trade in services, for all five measures. Secondly, the method of calculation for the measure of cultural distance will probably be of less importance than the cultural framework. Thirdly, it can be expected that the measures using the Inglehart-Welzel dimensions show similar estimates to the measure by Kaasa et al. (2016), due to the similarity in sources. Lastly, combining measures of cultural distance will add explanatory power to the regression or show that one of these measures is superior in explaining trade flows. The findings show that there most likely exists a negative relationship between cultural distance and the level of bilateral trade in services. However, the findings are not conclusive. In addition, the different measures of cultural distance do offer very different estimates, and combining these measures shows some interesting conclusions.

The remainder of this study is organized as follows. Section 2 presents the most relevant literature and introduces the cultural frameworks. Section 3 mentions the methods and data that are collected. Section 4 presents and interprets the results. Section 4 also discusses the limitations of the empirical analysis and presents some robustness checks. Section 5 concludes and suggests possibilities for further research. Section 6 includes the references. The appendices, in section 7, provide additional information to the analysis.

2. Relevant literature

International trade and cross-border investments are essential to the functioning of the world economy. In fact, in 2022 around 63% of the world's Gross Domestic Product (GDP) consisted of trade (data.worldbank.org, 2022).[3] In addition, international trade allows for specialization, resulting in more efficient use of global resources (Vijayasri, 2013). Furthermore, empirical studies find a positive relationship between international trade and the growth of countries (Balassa, 1989; van den Berg et al., 2008). This highlights the importance of trade and thus understanding trade patterns.

The gravity equation, originally formulated by Tinbergen in 1962, has proven to be extremely successful in empirically explaining bilateral trade flows (De Benedictis & Taglioni, 2011; Kandogan, 2016). The two expressions below, (1) and (2), display the gravity equation in its original form and with a logarithmic transformation, respectively. T_{ij} gives the trade flow between two countries (i and j), G is a constant, M_i and M_j indicate the (economic) size of countries i and j, and D_{ij} indicates the distance between countries i and j. α, β, and γ signify parameters to be estimated. Using the log-log form, shown in expression (2), the parameter estimates can be interpreted as elasticities (Baier & Standaert, 2020).

$$T_{ij} = G \cdot \frac{M_i^{\beta} \cdot M_j^{\gamma}}{D_{ij}^{\alpha}} \tag{1}$$

[3] Defined as the sum of exports and imports (Worldbank, 2022).

$$\ln T_{ij} = \ln G + \beta \ln M_i + \gamma \ln M_j - \alpha \ln D_{ij} + \varepsilon \quad (2)$$

In the simplest form, the gravity equation is used to show the direct positive effect of the economic size of two nations on their bilateral trade volume, and the inverse relation of the geographical distance between countries on their bilateral trade volume (Tinbergen, 1962; Head & Mayer, 2014). To capture the size of a trade flow between two countries literature has suggested different measures. To start, the Trade Intensity Index was proposed by Srivastava & Green (1986), which composes a value expressing the strength of trade relations between an exporting and an importing country (Srivastava & Green, 1986). However, later studies have mostly used bilateral trade flows, expressed in terms of export and/or import (Tadesse & White, 2010al; Tadesse & White, 2010b; Lankhuizen & De Groot, 2016). Alternatively, studies have used trade as a percentage of GDP (Kristjánsdóttir et al., 2017) or the sum of export and import between countries (Liu et al., 2020). The measure of economic size that is often used is GDP (De Benedictis & Taglioni, 2011). Theoretically, exports would increase in proportion to the (economic) size of the destination country and imports would increase in proportion to the (economic) size of the country of origin (Head & Mayer, 2014).

Provided that observed transaction costs are diminishing, the (academic) focus has been redirected to intangible barriers of transactions (Liu et al., 2020). The intangible barriers that are considered in literature can be divided in a few categories. First, geographical and historical determinants include adjacency of countries (Tadesse & White, 2010b), colonial history (Srivastava & Green, 1986; Lankhuizen & De Groot, 2016), and having a common official language (Tadesse & White, 2010a; Tadesse & White, 2010b; Liu et al., 2020). Secondly, demographic and economic aspects are considered, where besides GDP (per capita), population size is occasionally included in studies (Tadesse & White, 2010b; Kristjánsdóttir et al., 2017). Thirdly, the literature regards institutional quality and institutional distance as important determinants of bilateral trade flows (Anderson & Marcouiller, 2002; Lankhuizen et al., 2011). Lastly, the focus has been directed to cultural dimensions and cultural distance. The following two sections will elaborate on measures of cultural distance and the application of these in current literature.

2.1. Cultural dimensions and cultural distance

Cultural distance is mostly defined as the degree to which standard norms and values diverge between two countries (Hofstede, 2001; Kaasa et al., 2016). The phenomenon known as 'culture' is complicated, incomprehensible, and subtle, making it hard to properly define and quantify. As a result, measuring cultural distance is even more ambitious (Shenkar, 2012). Nonetheless, scholars have attempted to capture the concept. Hofstede (1980) was the first to create country scores expressing cross-national cultural diversity on a few dimensions (Beugelsdijk & Welzel, 2018). Overall, various measures of cultural differences are proposed in the literature. These measures differ over the concept of culture that is used and/or the methodology used to calculate the subsequent index. The former is often captured using multiple dimensions, such as those developed by Hofstede (Kaasa et al., 2016).

Critique has been expressed on the idea of developing a single measure to capture all cultural differences between two nations. Since it limits the possibility of observing which aspect of culture causes large differences in the aggregate measure and subsequently less (business) interactions. Furthermore, when the topic researched is more strongly related to one of the dimensions this may cause misleading results. On the other hand, developing a single measure for cultural distance makes the concept more tangible and enables broad research into the relationship between cultural distance and variables related to international business (Kaasa et al., 2016). The following subsections present three different existing measures of cultural traits and cultural distance.

2.1.1. The Hofstede's dimensions and the measure by Kogut & Singh

The most prominent measure of cultural distance was developed by Kogut & Singh (Kogut & Singh, 1988; Konara & Mohr, 2019; Kaasa et al., 2016). They brought forward an index to capture the cultural difference between two countries, based on the four cultural dimensions proposed by Hofstede (1980). The original measure by Kogut & Singh is an arithmetic average using the squared difference for all dimensions, corrected for the dimension's variance (Kaasa et al., 2016), as shown in expression (3). In this expression k indicates the cultural dimension, i and j denote the countries, V_k is the variance of the dimension's scores and N is the total number of dimensions.

$$CD_{ij} = \frac{1}{N} \cdot \sum_{k=1}^{N} \left[\frac{\left(I_{ik} - I_{jk}\right)^2}{V_k} \right] \tag{3}$$

The original cultural dimensions proposed by Hofstede in 1980 include uncertainty avoidance, individualism, power distance, and masculinity versus femininity. Uncertainty avoidance expresses the aversion or tolerance towards unpredictable situations and how well individuals deal with these circumstances (Beugelsdijk & Welzel, 2018). Under high uncertainty avoidance, people avoid unregulated situations (Kaasa et al., 2016). Individualism describes whether individuals view themselves as autonomous beings or as being part of a larger collective (Beugelsdijk & Welzel, 2018). For example, individual freedom and autonomy are important in more individualistic cultures, while in collectivist cultures, individuals express loyalty in exchange for being taken care of by a collective (Kaasa et al., 2016). Power distance describes how appreciative individuals are of (social) hierarchical structures and different kinds of authorities (Beugelsdijk & Welzel, 2018). For instance, in the case of a large power distance, an organization is characterized by centralized decision-making, while with a small power distance, the chain of command is not necessarily binding (Kaasa et al., 2016). Masculinity versus femininity in national culture deals with how pronounced certain characteristics are in a population. As such, masculinity is characterized by competitiveness and attaches great value to success and achievement. Whereas femininity translates to solidarity, caretaking, cooperation, and maintaining good relationships (Beugelsdijk & Welzel, 2018, Kaasa et al., 2016).

Originally, IBM questionnaires distributed (between 1968 and 1972) to employees in around 40 countries formed the basis to develop scores for all countries for each dimension, ordinally scaled (Kogut & Singh, 1988). Some positive features of this index are the large sample size, quantifiability of cultural characteristics, and its relation to workplace attitudes. Despite the critical view on the internal validity and construction of the ordinal scale, the index is deemed attractive to use (Kogut & Singh, 1988). The table below (Table 1) provides an example of how three specific countries score on these dimensions. The table analyzed the United States, China, and the Netherlands because these countries are trade-intensive countries and differ significantly in cultural characteristics.

Later, using data from WVS, two additional dimensions were added: long-term orientation and indulgence versus restraint. Firstly, long-term versus short-term oriented countries differ in how forward-looking and future-oriented individuals are, incorporating impatience to being rewarded for one's actions. Secondly, indulgence versus restraints expresses to what extent people act based on emotions and momentary pleasures or are mannered and suppress emotions. Table 1 also provides examples of country scores of these two dimensions. Since their development, the cultural dimensions by Hofstede have been applied in many studies in different fields (Beugelsdijk & Welzel, 2018). Like Hofstede's cultural dimensions, the subsequent measure of cultural distance, developed by Kogut & Singh (1988), has been widely applied to studies in the fields of management, finance, accounting, and so on (Kandogan, 2012; Shenkar, 2012).

Table 1. Examples of country scores of the Hofstede dimensions

	The United States	The Netherlands	China
Uncertainty avoidance	46	53	30
Individualism	91	80	20
Power distance	40	38	80
Masculinity	62	14	66
Long-term orientation	26	67	87
Indulgence	68	68	24

Table 1. Example of how the United States, the Netherlands, and China score on the six (unstandardized) cultural dimensions developed by Hofstede. The higher the score the more pronounced the cultural trait. For example, China scores much higher on long-term orientation compared to the United States and the Netherlands.
Source: geerthofstede.com, n.d.

Limitations and adjustments

Inconsistent findings from different studies have led to critique and proposals to improve the measure, highlighting the importance of its measurement and operationalization (Kandogan, 2010). For instance, some conceptual issues underlying the measure by Kogut & Singh have been pointed out in multiple studies. Starting with the fact that the measure disregards possible asymmetry and change in cultural distances over time (Shenkar, 2012; Kaasa et al., 2016). However, Kaasa et al. (2016) argued that this relates to asymmetries in 'psychic distance' rather than cultural distance.[4] Which implies that the latter is assumed to be symmetric. Furthermore, the assumption is made of linearity and causality in the relationship between cultural distance and dependent variables. The former assumption is not always valid, as the relationship may be non-linear. A last conceptual issue involves the question of whether cultural differences could potentially complement each other or whether some cultural traits are inherently more desirable. Methodologically, the generalizability of national culture to every firm in every location is questioned, in the case of existing corporate cultures and intra-cultural variation. For example, firms located in large cities might have a very distinct corporate culture from those firms located in rural areas (Shenkar, 2012; Kaasa et al., 2016). Furthermore, it was argued that cultures may have changed over multiple decades, making the data on the Hofstede dimensions outdated. Cultures may have changed due to globalization, the formation of the European Union, or increased traveling (Kaasa et al., 2016).

[4] Psychic distance is an individual-level concept. It is defined as an individual's perception of differences between a pair of countries. This preserved difference may result from geographical distance, social/cultural/economic/ etc. differences. It is often incorrectly interchangeably used with the concept of cultural distance (Kaasa et al., 2016).

Some adjustments are proposed as well. For instance, altering the formula to get the Euclidean index.[5] However, the literature found comparable results for the two measures (Kaasa et al., 2016). In addition, Shenkar (2012) proposed some accompanying research tools. First, the fifth cultural dimension of Hofstede, long-term orientation, should be included and in certain contexts dimensions should be included separately. Also, Shenkar (2012) advises pairing the Hofstede dimensions with dimensions constructed by other scholars or measures of cultural diversity within a country. Secondly, the national-level indices should be complemented by firm-level data on cognitive cultural measures. Thirdly, studies should control for the possible 'shrinking' of cultural distances, due to an increasing number of 'foreign' experiences. Fourthly, it should be empirically investigated whether cultural distance could have a role as a dependent variable rather than an independent variable in some economic matters (Shenkar, 2012).

Another issue that is addressed in the literature regards the correlation between pairs of dimensions. The measure by Kogut & Singh, given in expression (3), assumes the covariance of all pairs of dimensions is zero. Kandogan (2012) uses data on the cultural dimensions of Hofstede to test the statistical accuracy of this assumption. The study reports that there are multiple statistically significant positive and negative relationships between different pairs of dimensions. This implies that the covariances and correlation coefficients are not all zero, as assumed. The significant correlations are shown in Table 2. Correlation between one or more pairs of dimensions can lead to over- or under-estimation of the cultural distance. An adjustment is suggested to overcome this issue, resulting in the Mahalanobis method.[6] Compared to the original measure by Kogut & Singh, the modified measure shows more moderate and less varying cultural distances, where small and large distances are less frequent.

Table 2. Correlation matrix Hofstede dimensions

	1	2	3	4	5
1. Uncertainty avoidance	-				
2. Individualism	Negative	-			
3. Power distance	Positive	Negative	-		
4. Masculinity				-	
5. Long-term orientation		Negative	Positive		-

Table 2. Correlation matrix of the five cultural dimensions by Hofstede. Significance is judged on at least a 90% significance interval.
Source: Kandogan, 2012

2.1.2. The Inglehart-Welzel map and the measure by Tadesse & White

Besides Hofstede's cultural dimensions, another frequently used framework to analyze national cultures is proposed by Inglehart (Inglehart, 1997). Inglehart's dynamic theory of culture focuses on the change in cultural aspects due to modernization and economic development. The Inglehart-Welzel map shows major cultural changes and the persistence of specific cultural traditions (Inglehart & Welzel, 2005). The Inglehart-Welzel map locates countries based on two dimensions: traditional versus secular-

[5] The Euclidean index is based on the Euclidean distance, which is calculated as the square root of the sum of differences (between the scores of two countries), corrected for the variance.
[6] To calculate the cultural distance the Mahalanobis distance is taken and squared. This is then divided by the number of dimensions that are considered. The Mahalanobis distance is given by:
$D_{ij} = \sqrt{(I_i - I_j)^T S^{-1} (I_i - I_j)}$. Where I_x is a vector of the indices for all dimensions for country x and S gives the matrix of variances and covariances for all dimensions and all pairs of dimensions.

rational values (TSR) and survival versus self-expression values (SSE) (Welzel, 2013; Beugelsdijk & Welzel, 2018). Traditional values articulate the importance of religion, respect for authority, and parental bonds. This implies that a population is nationalistic and rejects interference with some parts of life, e.g. abortion. Secular-rational values are, on the contrary, non-traditional and the emphasis is on other aspects, rather than family- and religion-related aspects (Inglehart & Welzel, 2005). Societies with stronger secular values are often more emancipative, emphasizing human autonomy (Inglehart & Welzel, 2005; Tadesse & White, 2010b). Combining these two sides, the first dimension (TSR) distinguishes countries for which hierarchical structures, religion, family, and obedience to some sort of authority are valued, from those in which self-expression and individualism are appreciated. In addition, in societies with strong traditional values social conformity is deemed more important than individualistic development (Inglehart & Welzel, 2005; Tadesse & White, 2010b). Survival values highlight the importance of economic and physical security. In addition, it is associated with low levels of trust and tolerance. Self-expression values, on the other hand, are associated with high tolerance, gender equality, and active economic and political participation (Inglehart & Welzel, 2005). Comparing these types of values, the second dimension (SSE) has on one side survival values, emphasizing self-denial and dedication, and on the other side self-expression values, emphasizing the equality of minorities and quality of life. The former is often expressed through hostility towards foreigners, ethnical- and other types of minorities. Societies where these survival values are pronounced often have lower levels of subjective well-being and health. In addition, these societies are said to be materialistic and often rely on authoritarian governments (Inglehart & Welzel, 2005; Tadesse & White, 2010b).

The values of this map were constructed using questions from various waves of the WVS, across ten different indicators. It should be noted that this is a much more simplified version of the indicators and does not completely cover all cross-cultural variations. Using the Inglehart-Welzel map some conclusions can be drawn about cultural differences. For instance, survival values are often more pronounced in East European countries pe (such as Bulgaria and Russia), while self-expression is more pronounced in Western European countries (such as Norway and Sweden). Generally, it could be said that the economic development of a country tends to move a country towards having more secular and self-expression values compared to developing countries. However, this strongly interacts with country-specific characteristics, such as politics and religion (worldvaluessurvey.org, n.d.).

Tadesse & White (2010a) have used the dimensions summarized on this map to construct a second measure of cultural distance, shown in expression (4). In this expression, $\overline{TSR}$ and $\overline{SSE}$ give the average score for the dimensions for country i and j. The measure of cultural distance is calculated by taking the square root of the sum of the squared differences of these dimensions for two countries. Moreover, the lack of dynamics in Hofstede's framework and the lack of dimensionality by Inglehart, potentially makes the two frameworks complementary, and synthesis is proposed in the literature. Again, examples of country scores on these two dimensions for the United States, the Netherlands, and China are provided in Table 3.

$$CD_{ij} = \sqrt{\left(\overline{TSR}_j - \overline{TSR}_i\right)^2 + \left(\overline{SSE}_j - \overline{SSE}_i\right)^2} \quad (4)$$

Table 3. Examples of country scores of the Inglehart-Welzel dimensions

	United States	*The Netherlands*	*China*
Traditional vs secular values	*-1.07*	*0.55*	*0.66*

Survival vs self-expressions values	*1.27*	*0.91*	*-0.48*

Table 3. Example of how the United States, the Netherlands, and China score on the two (standardized) dimensions of the Inglehart-Welzel map. For the first dimension, a higher number signifies more 'secular' values. For the second dimension, a higher number signifies more 'self-expression' values. This means that among these three countries, the US is the most 'traditional' and China has the strongest 'survival' values.
Source: worldvaluessurvey.org, 2023

2.1.3. The ESS/EVS-based measure by Kaasa et al.

Kaasa et al. (2016) have developed a third, relatively new, dataset measuring cultural distance on a country and regional level for European countries. The focus will be on the dataset for country-level cultural distance, to make it comparable to the other measures. This measure of cultural distance is based on the EVS and the ESS. The EVS is a large-scale, cross-sectional repeated survey that covers human values (ideas, preferences, and beliefs) of European citizens (europeanvaluesurvey.eu, n.d.). The ESS is an academically-driven survey, based on face-to-face interviews, that covers attitudes, beliefs, and behavioral patterns of citizens in Europe (europeansocialsurvey.org, n.d.). Like the measure of cultural distance by Kogut & Singh, the Hofstede dimensions formed the basis for the measure by Kaasa et al. (2016). The authors strived to develop an index that considers some of the limitations that are expressed about the measure by Kogut & Singh (section 2.1.1).

Firstly, the original data for the Hofstede dimensions were based on a survey collected in one firm in around 40 countries. It has been argued that this may not be representative of a whole population, due to homogeneity in age, occupation, and other aspects. The EVS and ESS offer data that are more representative of a country's whole population (Kaasa et al., 2016). Secondly, most of the current literature considers the cultural distance of a single country, say country i, to several other countries. Kaasa et al. (2016) proposed a matrix where cultural distance is determined for all combinations of European countries. Thirdly, within-country differences, based on regions, in cultural distances are also considered in this measure. The ESS and EVS allowed for this, as data are collected on a regional level as well. However, as mentioned before, the focus will be on the country-level indices (Kaasa et al., 2016).

The measure by Kaasa et al. (2016) employs the four original Hofstede dimensions: power distance, uncertainty avoidance, individualism, and masculinity versus femininity. The EVS and ESS are complementary in terms of topics discussed in their questions and both include a variety of questions relating to the cultural dimensions as formulated by Hofstede. However, the final index by Kaasa et al. (2016) slightly disagrees with this cultural framework due to various reasons. Namely, different questions are used to determine the value of each dimension, it concerns a population-based survey rather than an employee-based survey, and the period differed. This means that there is no strong correlation between this measure and the initial Hofstede dimensions. The measure is calculated by the arithmetic average of the variance-corrected squared differences in the four cultural dimensions, like the measure by Kogut & Singh. When the indicators for the cultural dimensions have been standardized, in confirmatory factor analysis, the expression can be rewritten as shown in expression (5). In this expression, k indicates the cultural dimension, i and j denote the countries and N is the total number of dimensions.

$$CD_{ij} = \frac{1}{N} \cdot \sum_{k=1}^{N} \left[\left(I_{ik} - I_{jk} \right)^2 \right] \tag{5}$$

Kaasa et al. (2016) strived to recreate Hofstede's dimensions using different questions than were originally asked. To do this the authors use the characteristics and dimensions extremes as described by Hofstede. For instance, to assess power distance the authors used ESS and EVS questions on confidence in the parliament and satisfaction with democracy. Attitudes towards hierarchy were related to the attitudes toward income inequality. Uncertainty avoidance was assessed by, among others, questions about safety, job security, and trust in others. Masculinity versus femininity was assessed by questions on the importance of success, achievement, and other masculine values. Lastly, to assess individualism, questions on individual decision-making, leisure time, and independence were used (Kaasa et al., 2014).

However, Kaasa et al. (2016) are critical of their own dataset and point out some of its limitations. Firstly, the data is only collected for most European countries. Secondly, they concluded that due to the lack of correlation between their measure and Hofstede's dimensions, it remained unclear whether this new measure of cultural distance would be useful in research. Namely, they fear that not exactly the same phenomena are captured. Therefore, they invite academics to apply their measure and provide data to investigate the usefulness of this new measure (Kaasa et al., 2016).

Moreover, the lack of dynamics in Hofstede's framework and the lack of dimensionality by Inglehart, potentially makes the first two frameworks complementary, and synthesis is proposed in the literature. In addition, the ESS-EVS-based cultural distance measure was developed to improve the cultural distance measure put forward by Kogut & Singh. Overall, there is no consensus on which measure of cultural distance is most complete and is preferred to investigate the effect of cultural distance on bilateral trade flows. The empirical analysis will further compare these measures and investigate potential combinations.

2.2. Trade and cultural distance

Due to globalization and reliance on global value chains, companies have become more dependent on partners in culturally dissimilar countries (Tadesse & White, 2010b). Cultural differences potentially increase transaction costs between two entities, due to asymmetric information, complicating interaction, and impeding trust (Tadesse & White, 2010a; Liu et al., 2020). This would negatively affect their bilateral trade volume. This trade-inhibiting impact of cultural distance is expected to be more pronounced for the trade in services, which is more sensitive to failures in communication (Harms & Shuvalova, 2020). Furthermore, it may be the case that cultural distance serves as a proxy for institutional dissimilarity or distrust (Tadesse & White, 2010b), as they are both observed as intangible barriers (Liu et al., 2020). Cultural similarity could also potentially increase trade flows between countries due to similarity in preferences of products (Liu et al., 2020). These arguments give rise to a negative association between cultural distance and trade flows. On the other hand, some studies argue that companies prefer to trade with culturally dissimilar countries if the alternative is producing and/or providing locally, as cultural distance makes cross-border expansions riskier. Namely because of the unknown code of conduct (Tadesse & White, 2010b). In this case, trade substitutes FDI (Lankhuizen & De Groot, 2016). Large cultural dissimilarities could also be accompanied by differences in comparative advantages. It may then be valuable to trade and exploit the comparative advantage, despite the barriers caused by cultural differences (Lankhuizen & De Groot, 2016). These arguments give rise to a positive association between cultural distance and trade flows. Multiple studies have attempted to use existing measures of cultural dimensions and distance to determine patterns of bilateral trade. This section seeks to outline current findings on the relationship between cultural distance and bilateral trade.

Current literature can be distinguished based on the choice of the dependent variable, the selection of control variables, and the methodology. Earlier studies mostly use Ordinary Least Squares (OLS) estimation with a logarithmic transformation of the dependent and independent variables (Srivastava & Green, 1986; Tadesse & White, 2010a). Later studies incorporate country-specific and other types of fixed effects (Lankhuizen & De Groot, 2016), Tobit specifications, Poisson GEE[7] (Liu et al., 2020), and PPML[8] (Harm & Shuvalova, 2020). However, the most important distinction can be made based on the type of cultural distance measure that is applied. Table 4 provides an overview of the findings in the literature on the effect of cultural distance on bilateral trade flows. Srivastava & Green (1986) argue that their measure of cultural similarity is far too simplistic and that a more sophisticated measure is expected to explain much more of the variation in trade intensity (Srivastava & Green, 1986). Similarly, it is stated that geographical distance and simple cultural components, such as religion, are not sufficient to capture the cost of trading (Tadesse & White, 2010b). Hence subsequent studies have considered the cultural distance measures that were introduced in section 2.1. Overall, most studies report a significant negative effect of cultural distance on bilateral trade flows, as can be observed in Table 4. However, some studies report a non-linear relationship (Lankhuizen & De Groot, 2016), as hypothesized by Shenkar (2012). Thus, it may well be the case that for certain pairs of countries, the relationship is positive, while for others it is negative, conditional on the size of their cultural differences.

To conclude, evidence of a negative and non-linear association between cultural distance and bilateral trade flows is found. However the magnitude and sign tend to vary over specifications. This emphasizes the need to investigate the difference in findings on the relationship between various measures of cultural distance and bilateral trade flows, in an otherwise identical specification. In addition, few studies have considered the effect of cultural distance on trade in service alone.

Table 4. Studies on the effect of cultural distance on trade flows

Study	Effect cultural distance on bilateral trade (in services)	Measure of cultural distance	Sample
Srivastava & Green (1986)	There is a small positive effect of cultural similarity on the intensity of trade.	Cultural similarity: having a common religion and language	45 exporting and 82 importing countries
Tadesse & White (2010a)	A one percent increase in the cultural distance decreases exports by around 0.29%.	Index based on Inglehart-Welzel dimensions	The US states and their international trading partners
Tadesse & White (2010b)	A 1% increase in cultural distance reduces aggregate imports by 0.78%. But this estimate differs over the OECD countries and disaggregate trade.	Index based on Inglehart-Welzel dimensions	Nine OECD countries and their trading partners, 67 countries
Lankhuizen et al. (2011)	Without fixed effects cultural distance positively affects exports, while with	Index by Kogut & Singh, based on Hofstede dimensions	12 OECD countries and their OECD and non-OECD trading partners

[7] Poisson generalized estimation equation.
[8] Poisson pseudo-maximum likelihood estimation.

	fixed-effects the effect becomes negative.		
Lankhuizen & De Groot (2016)	There exists a non-linear relationship between cultural distance and bilateral trade, which is positive first and then negative (after a certain threshold).	Index by Kogut & Singh, based on Hofstede dimensions	210 country pairs
Harms & Shuvalova (2020)	Increasing cultural distance by two standard deviations reduces exports in services by 14 percent.	Mahalanobis distance, based on Hofstede dimensions	54 trading partners
Liu et al. (2020)	A one standard deviation increase in the cultural distance decreases aggregate trade by 9.59% of its standard deviation.	Index by Kogut & Singh, based on Hofstede dimensions	China and 99 trading partners

Table 4. This table provides information on the studies that have investigated the relationship between cultural distance and the level of bilateral trade between nations. It includes the names of the authors, the most important finding, the cultural distance measure that was used and the sample size.

3. Methods & Data

This section presents the methodology and data. First, the model set-up, variables and data are presented. A complete overview of all variables, descriptions, year(s) from which the variable was retrieved, and unit of measurement can be found in Appendix A. Secondly, descriptive statistics are given, and the method of estimation is introduced. Lastly, a preliminary analysis is performed, stating the most important hypotheses.

3.1. Model set-up and data

The expression below shows the general set-up of the regression specifications. In total, 13 main specifications will be executed, using both cross-sectional and panel data.[9] An overview of the specifications is provided in Appendix C. The specifications using cross-sectional data will include fixed effect for countries (α_i, α_j), while the panel specification will also include time fixed effects (α_t). In addition, the data will be balanced, meaning that all regressions apply the same set of observations.[10]

$$BT_{ij,t} = \beta_0 + \beta_1 \, ln(CD_{ij,t}) + \boldsymbol{\Sigma\beta_k CONTROLS_{ij,t}} + \boldsymbol{\Sigma\beta_l CONTROLS_{i,t}} + \boldsymbol{\Sigma\beta_m CONTROLS_{j,t}} + \alpha_i + \alpha_j + \alpha_t + \varepsilon_{ij} \quad (6)$$

[9] The choice was made to collect panel data (based on availability) for the years 2014, 2016, 2018 and 2020. It is important to note that only for a set of variables panel data were available. These include bilateral trade (BT), the GDPs (GDP1 and GDP2), the GDPs per capita (GDP_CAP1 and GDP_CAP2), population size (POP_SIZE1 and POP_SIZE2), institutional quality (INST_QUA1 and INST_QUA2) and institutional distance (INST_DIST).
[10] This is done by dropping all observations for which a cultural distance measure is missing. This reduces the number of observations significantly.

Dependent variable: bilateral trade in services

As a dependent variable, all regressions will use the level of bilateral trade in services between countries $(BT_{ij,t})$. Data on bilateral trade in services are retrieved from the Organization for Economic Cooperation and Development (OECD, 2024). The OECD, in collaboration with the World Trade Organization (WTO), provides a balanced dataset on trade, covering 200 reporting countries and their trading partners, for different service categories. These categories include the 12 main EBOPS2010 (BPM6) service categories (Liberatore & Steen, 2021).[11] For this analysis, the exports for 2014, 2016, 2018, and 2020 will be employed. These exports are expressed in millions of US dollars converted by the respective exchange rates. It should be noted that every pair of countries has two observations per year for their bilateral trade flow, as we observe both exports from country i to country j and vice versa.

Main independent variable: cultural distance

The main independent variable of interest is the logarithm of cultural distance between the two countries $(\ln(CD_{ij,t}))$, for which only one observation, at one point in time, is available per country pair. For this variable five different measures will be employed. To start, the six Hofstede dimensions are used to calculate the measure of cultural distance as proposed by Kogut & Singh (1988). This follows the calculation as explained in expression (3). This variable will be referred to as CD_KS_HOF.[12] In addition, the six Hofstede dimensions are employed using the methodology proposed by Tadesse & White (2010a; 2010b), following the method of expression (4). Before doing this the Hofstede dimensions were standardized. This variable will be referred to as CD_TW_HOF. The website developed by Geert Hofstede provides data on the Hofstede dimensions. These data correspond to definitions in the 3rd (2010) edition of 'Cultures and Organization' by Hofstede et al. (2010) and the data that was used in the edition of 2015 (Hofstede, 1980; 2001). The data were retrieved using a Value Survey Module (VSM) (geerthofstede.com, n.d.). For this analysis, data are used on the six dimensions for around 110 countries. However, it should be noted that this dataset contains a lot of missing values, making the remaining dataset smaller.

Furthermore, the Inglehart-Welzel dimensions are used to fabricate two measures of cultural distance. The first follows the method of expression (4), replicating the original measure developed by Tadesse & White (2010a; 2010b). This variable will be referred to as CD_TW_ING. The second, follows the method of expression (3), replacing the Hofstede dimensions with the two Inglehart-Welzel dimensions. This variable will be referred to as CD_KS_ING. For these two measures, data on the Inglehart-Welzel values are retrieved. The 2023 version of the cultural map is based on the WVS and EVS distributed between 2017 and 2022, but for missing countries older values were included. The map includes around 110 countries (worldvaluessurvey.org, 2023). For this analysis, the goal is to select the most recent scores for each country depending on the availability of data.

The last variable for cultural distance is the measure constructed by Kaasa et al. (2014; 2016), based on the ESS and EVS, following expression (5). This variable will be referred to as CD_ESSEVS. Thus, data is retrieved on this cultural distance measure. The dataset consists of a matrix in which, for all combinations of 30 European countries, the cultural distance measure is noted. This measure was calculated using the EVS and the ESS from 2008.

[11] Appendix A lists these service categories.

[12] CD refers to cultural distance, KS refers to Kogut & Singh, HOF refers to the Hofstede dimensions.

3.1.1. Control variables

The specifications also include (logarithms of) control variables at an individual country level $(CONTROLS_{i,t}, CONTROLS_{j,t})$ as well as for pairs of countries $(CONTROLS_{ij,t})$. A list of control variables can be found in Appendix C. This section describes the choice of control variables, based on literature and a correlation analysis, provided in Appendix B.

Geographical and historical variables

Geographical distance is expected to negatively affect trade flows between nations, as it (partially) represents transportation costs (Srivastava & Green, 1986; Tadesse & White, 2010a; Tadesse & White, 2010b; Head & Mayer, 2014; Liu et al., 2020). Most studies use the geographical distance between capital cities (Lankhuizen et al., 2011; Lankhuizen & De Groot, 2016; Liu et al., 2020) or measures using longitudes and latitudes of the most important cities (Kandogan, 2016). This study applies the logarithm of geographical distance between the most important cities as a control variable.[13] Another geographical feature that is deemed to have a positive effect on bilateral trade is adjacency of two countries (Head & Mayer, 2014; Tadesse & White, 2010b). Although having a common border has been shown to be more important for trade in goods than for trade in services (Harms & Shuvalova, 2020), this analysis includes a dummy on whether two countries have a common border. Furthermore, the literature has identified colonial heritage as a crucial determinant of the amount of trade between nations, especially increasing the intensity in trade in services (Srivastava & Green, 1986; Lankhuizen & De Groot, 2016; Harms & Shuvalova, 2020). Therefore, this analysis uses a dummy indicating whether two nations have a colonial link. In addition, having a common language has been identified as an important factor in the determination of trade intensity and has been regarded as an imperfect measure of cultural similarity (Tadesse & White, 2010a; Tadesse & White, 2010b; Liu et al., 2020). Also, it is found that having a common language especially encourages trade in services (Harms & Shuvalova, 2020). For this reason, this analysis uses a dummy on whether two countries share an official language.[14] For these geographical and historical control variables, data are retrieved for CEPII.[15]. The dataset consists of data points for pairs of countries and stems from 2011 (Mayer & Zignago, 2011).

Demographic and economic variables

Demographic variables, such as GDP and population size, are used to indicate a country's market size, stage of economic development and economic wealth and have been shown to be significant in analyzing bilateral trade flows (Srivastava & Green, 1986; Tadesse & White, 2010b; Head & Mayer, 2014; Kristjánsdóttir et al., 2017). Most literature includes the total GDP (per capita) for both countries and/or the product of the GDPs (per capita) of both countries, to account for the combined effect of economic size (Lankhuizen et al., 2011). In most studies, a logarithmic transformation is applied (Tadesse & White, 2010a; Tadesse & White, 2010b; Lankhuizen & De Groot, 2016; Liu et al., 2020). In addition, GDP may serve as a proxy for omitted variables in some cases. For instance, Lankhuizen et al. (2011) emphasize the strong correlation between GDP per capita and institutional quality.

[13] Based on Table B3 (in Appendix B), the choice was made to omit the geographical distance of capital cities (GEO_DIST_CAP) from the analysis, due to its strong correlation with geographical distance of the most important cities (GEO_DIST) (Mindrila & Balentyne, 2017).

[14] Based on Table B1 (in Appendix B), the choice was made to omit the common language spoken by at least 9% of the population (COM_LANG) from the analysis, due to its strong correlation with the common official language (COM_LANG_OFF) (Mindrila & Balentyne, 2017).

[15] Centre d'Études Prospectives et d'Informations Internationales (CEPII) is a French organization for research and expertise on the world economy (cepii.fr, n.d.).

Therefore, this analysis uses the logarithm of the GDP of both countries as a control variable.[16] Data on GDP in US dollars, for the years 2014, 2016, 2018 and 2020 are retrieved from the World Bank (The World Bank, 2022).[17]

Institutional variables

Literature has also identified some political and institutional variables that may be crucial in explaining the amount of trade between two nations. Lankhuizen et al. (2011) employed a variable of institutional quality. Institutional quality affects the transaction environment and the security of trade through the degree of corruption, contract enforceability, and expropriation risks (Anderson & Marcouiller, 2002; Lankhuizen et al., 2011; Liu et al., 2020). Furthermore, similarity between institutional quality may support higher trade flows, therefore literature highlights institutional distance as an important determinant of trade flows (Lankhuizen & De Groot, 2016; Harms & Shuvalova, 2020; Liu et al., 2020). Institutional distance measures the compatibility of institutional quality of two countries (Liu et al., 2020). Therefore, this analysis employs the logarithm of institutional distance. To construct this variable, data are retrieved on the Worldwide Governance Indicators (WGI)/Kaufmann indicators. The WGI consist of six dimensions for which data were collected for around 200 countries between 1999 and 2022. The World Bank provides a dataset, consisting of data on the six standardized indicators for 2014, 2016, 2018, and 2020 (worldbank.org, n.d.).[18] Cultural distance is calculated using these six indicators, following the method by Kogut & Singh (1988), shown in expression (3).[19]

3.1.2. Descriptive statistics

The table below (Table 5) provides descriptive statistics on the most important dependent and independent variables, that will be included in the regression specifications. Appendix D provides descriptive statistics on the excluded variables and the non-logarithmic versions of the most important variables.

Table 5.
Descriptive statistics

This table provides descriptive statistics, which include the number of observations, mean, standard deviation, minimum, and maximum for the following variables: bilateral trade, the logarithm of the five different measures of cultural distance (CD_KS_HOF, CD_TW_HOF, CD_TW_ING, CD_KS_ING

[16] Based on Table B2 (in Appendix B), the choice was made to omit the population size (POP_SIZE1 and POP_SIZE2) and GDP per capita (GDP_CAP1 and GDP_CAP2) from the analysis, due to their strong correlation with GDP (GDP1 and GDP2) (Mindrila & Balentyne, 2017).

[17] The share of immigrants has also been highlighted as a possible explanatory demographic variable for the intensity of trade between two nations. Namely, it is argued that immigrants exert a pro-export effect, increasing bilateral trade and offsetting the negative effects of cultural differences (Tadesse & White, 2010a). However, the latter has not been fully sustained by evidence (Tadesse & White, 2010b). In addition, the share of migrants in a population mostly affects trade in goods rather than services (Harms & Shuvalova, 2020). After running regressions including the share of migrant, the choice was made to omit this variable from the empirical analysis. These data are available for the year 2015 (The World Bank, 2019).

[18] The Kaufmann indicators/WGI: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption (worldbank.org, n.d.; Kaufmann et al., 2005).

[19] Some literature also suggests including a dummy indicating whether two countries are in a common economic union, e.g. The European Union. However, they found that this dummy does not significantly affect the trade flow between countries, which may be due to the large effect that geographical distance exerts (Srivastava & Green, 1986). In addition, the final balanced sample will only include European countries, which makes this variable of little value added. Thus, the choice was made to omit this variable from the main specifications.

and CD_ESSEVS), the logarithm of geographical distance, institutional distance (based on the six Kaufmann indicators), GDP and three dummies (common border, common language, colonial link). The descriptive statistics are based on the panel dataset that was composed. It should be noted that the summary statistics are determined based on the balanced dataset, including only European countries.

VARIABLES	N	mean	St. dev.	min	max
Bilateral trade	2,400	1.964e+09	4.507e+09	1.201e+06	3.632e+10
Log geographical distance	2,400	7.048	0.633	4.394	8.272
Log GDP	2,400	26.43	1.398	23.90	29.01
Log CD_KS_HOF	2,400	0.435	0.785	-2.728	2.116
Log CD_TW_HOF	2,400	1.083	0.410	-0.795	1.945
Log CD_TW_ING	2,400	0.268	0.717	-2.116	1.329
Log CD_KS_ING	2,400	-0.346	1.384	-4.975	1.661
Log CD_ESSEVS	2,400	0.141	0.998	-3.511	2.018
Log institutional distance	2,400	-0.947	1.414	-4.908	1.888
Common border	2,400	0.110	0.313	0	1
Common official language	2,400	0.0267	0.161	0	1
Colonial link	2,400	0.0300	0.171	0	1

3.2. Estimation method

The logarithmic transformation of certain core variables in the gravity equation, as proposed in literature, may cause inaccuracies. Therefore, alternative literature suggests using PPML as the estimation method (Santos Silva & Tenreyro, 2006). This deals with multiple issues. First, literature has highlighted the importance of dealing with values of zero for bilateral trade flows. Also because the reason for a zero value may be associated with the characteristics of a country (Santos Silva & Tenreyro, 2006). PPML is, in contrast to a logarithmic transformation and OLS, able to deal with zero flows (Linders & De Groot, 2006; Martin & Pham, 2016). Secondly, in the case of heteroskedasticity, applying a logarithmic transformation may lead to correlation between the error term and terms of the regression (Harms & Shuvalova, 2020). In this case, interpreting the coefficients of a log-linearized regression as elasticities may be inaccurate and the estimation will become inconsistent (Santos Silva & Tenreyro, 2006). Santos Silva & Tenreyro (2006) conclude that heteroskedasticity is a problem in the standard gravity model as well as in the gravity equation that uses fixed effects. Comparing results from OLS with results from PML yields different conclusions on the importance, size, and significance of certain regressors. Therefore, the gravity equation should be estimated using PPML (Santos Silva & Tenreyro, 2006; Baier & Standaert, 2020). Thirdly, PPML is said to be a more efficient estimation method compared to non-linear least squares (NLS), proposed by Frankel & Wei (1993) (Santos Silva & Tenreyro, 2006).

Furthermore, De Benedictis & Taglioni (2011) highlight the importance of using panel data and fixed effects. Many studies, analyzing the effect of a certain measure of (cultural) distance on bilateral trade, have employed panel data (Tadesse & White, 2010b; Kandogan, 2016; Kristjánsdóttir et al., 2017; Liu et al., 2020; Harms & Shuvalova, 2020; Lankhuizen et al., 2011). Anderson & van Wincoop (2003) proposes using fixed effects for both countries to account for multilateral resistance terms. Applying fixed effects using panel data is a simple approach to capture more efficient and consistent estimates (Lankhuizen et al., 2011; Kandogan, 2016). Using time-varying fixed effects for exporting and importing countries accounts for unobserved characteristics of these countries (Kandogan, 2016). In addition, fixed effects may control for overstatement of trade flows for countries that often serve a transit function, e.g. the harbor of Rotterdam (Head & Mayer, 2014). Interestingly, Harms & Shuvalova (2020) report that having only one point of data for the cultural distance measure is not a problem in a panel data specification, as culture is slow to change (Harms & Shuvalova, 2020). In addition, using panel data allows for the incorporation of time-fixed effects. To conclude, this empirical analysis will employ PPML as the main estimation method. The cross-sectional specifications will apply fixed effect of countries. The panel specifications will apply fixed effects on countries and time.

3.3. Preliminary analysis

Correlations matrix: cultural distance measures

The different measures of cultural distance all have a significant positive relationship with each other, which can be seen in Table 6. The strongest correlations are found between CD_KS_HOF and CD_TW_HOF, and CD_TW_ING and CD_KS_ING. This seems apparent, as these measures were calculated using the same cultural dimensions and dataset. This may suggest that the method used to calculate the cultural distance will less meaningfully affect the results from associating these measures with the level of bilateral trade in services. Furthermore, there are quite strong correlations between the measures that employ the Inglehart-Welzel dimensions (CD_TW_ING and CD_KS_ING) and the cultural distance measure constructed by Kaasa et al., which uses the ESS and EVS (CD_ESSEVS). This seems plausible as the data for the Inglehart-Welzel dimensions are also partly based on the EVS. Kaasa et al. (2016) expressed concern about the lack of correlation between their measure (CD_ESSEVS) and the Hofstede dimensions. They reported correlation coefficients between 0.37 and 0.66, applying only four original Hofstede dimensions (Kaasa et al., 2014). Table 6 shows similar correlation coefficients between their measure (CD_ESSEVS) and the measures based on the six Hofstede dimensions (CD_KS_HOF and CD_TW_HOF). This lack of correlation may imply that one of the measures will be less suitable or that these measures may be complementary. The measures that draw from completely different data sources and/or apply different dimensions are correlated least strongly, e.g. CD_KS_HOF and CD_TW_ING. This may imply that the source of data and choice of a cultural framework significantly impacts the empirical findings when a relationship is drawn between these measures and the intensity of trade in services. Nevertheless, this table is not adequate in drawing this conclusion. Overall, the observed correlation coefficients seem to be explainable and articulate the points of focus for the remainder of this empirical analysis.

Table 6. Correlation matrix of cultural distance measures

	CD_KS_HOF	CD_TW_HOF	CD_TW_ING	CD_KS_ING	CD_ESSSEVS
CD_KS_HOF	1.000				
CD_TW_HOF	0.9643	1.000			
CD_TW_ING	0.4201	0.4499	1.000		
CD_KS_ING	0.4496	0.4736	0.9688	1.000	
CD_ESSEVS	0.3928	0.4113	0.7400	0.7598	1.000

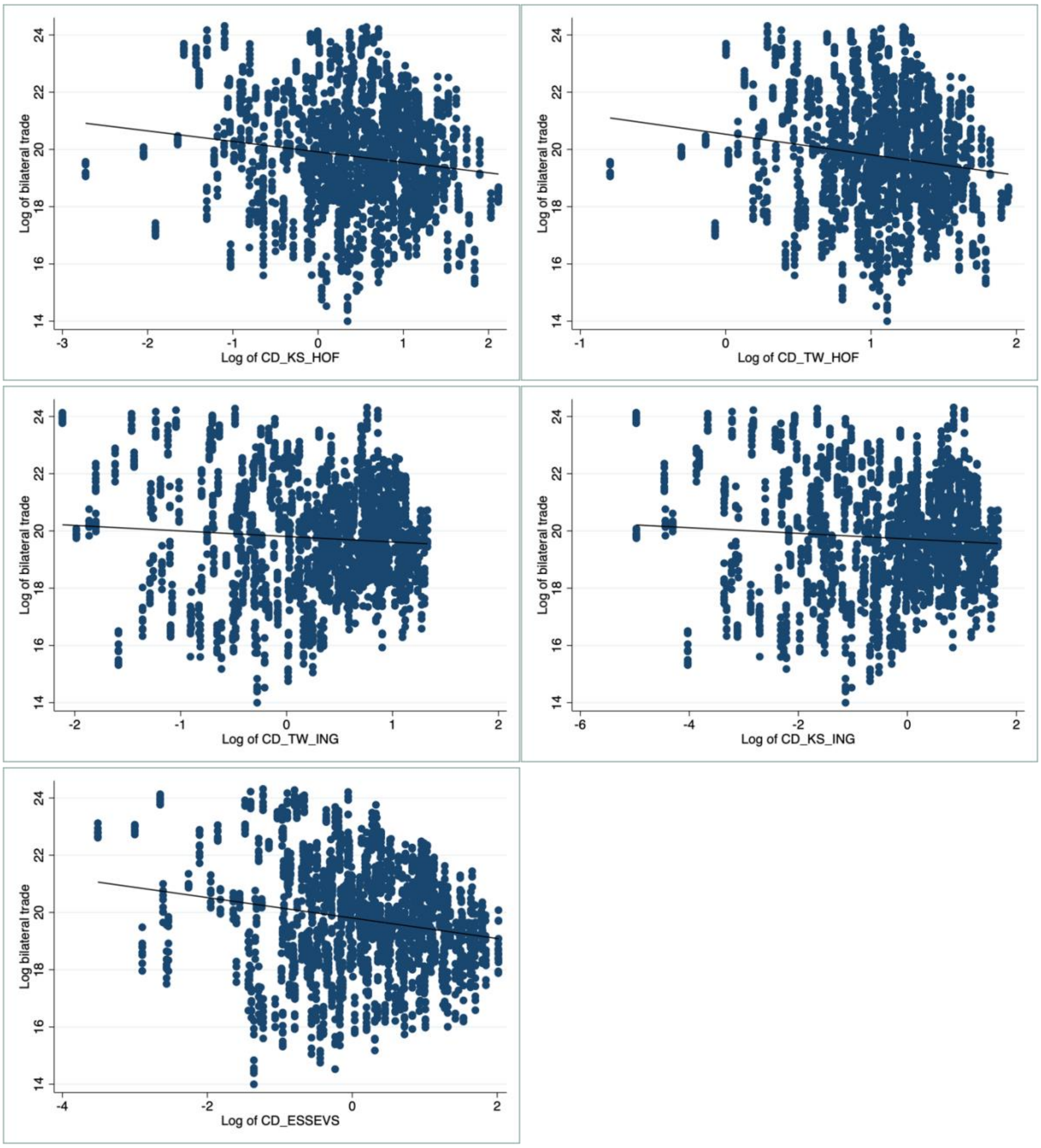
Table 6. This table shows the correlation coefficients for different pairs of measures of cultural distance. All these correlation coefficients are significant at a 1-percent level. These correlations are based on the balanced dataset.

Scatterplots: bilateral trade and cultural distance measures

The scatterplots provided below show the relationships between the logarithm of various measures of cultural distance and the logarithm of bilateral trade in services, for the observations in the balanced sample. It can be observed that for all different measures of cultural distance the relationship is negative.

This seems the most plausible as a large (cultural) distance between nations is expected to decrease their level of trade in services, as stated by previous studies.

Figures 1-5. Preliminary scatterplots



Figures 1-5. These scatterplots show the relationship between the logarithm of bilateral trade in services and the logarithm of various measures of cultural distance (CD_KS_HOF, CD_TW_HOF, CD_TW_ING, CD_KS_ING and CD_ESSEVS). The balanced dataset was used to construct these scatterplots.

3.3.1. Hypotheses

Based on the literature and the preliminary analysis, some hypotheses have been established.

Hypothesis 1. Cultural distance is expected to have a negative effect on the level of bilateral trade in services, independent of which measure of cultural distance is applied.

Hypothesis 2. The cultural framework is expected to be of more importance, compared to the method, in determining the effect of cultural distance of bilateral trade in services. Therefore, CD_KS_HOF will likely show similar results to CD_TW_HOF. Likewise, similar estimates are expected for CD_TW_ING and CD_KS_ING.

Hypothesis 3. The measures using the Inglehart-Welzel dimensions (CD_KS_ING and CD_TW_ING) are expected to show similar estimates to the measure by Kaasa et al. (2016) (CD_ESSEVS), due to their similar data sources.

Hypothesis 4. Combining some of the measures of cultural distance is expected to add explanatory power to the regression or shows that one of these measures is superior in explaining the level of bilateral trade in services.

4. Results

This section presents the results of the different regression specifications. First, the estimates for the individual measures of cultural distance will be discussed. Secondly, the estimates of combined measures of cultural distance will be analyzed. Thirdly, the findings from a robustness analysis will be presented. In addition, a discussion is offered on possible limitations and issues regarding the empirical approach of this study.

4.1. Individual measures of cultural distance

Specifications (1)-(5) provide the gravity equation with the five different measures of cultural distance, using balanced panel data and fixed effects for countries and time.[20] Table 7 reports the findings for the first five specifications. Furthermore, all specifications have also been executed using cross-sectional data, only using fixed effects for countries, referred to as specifications (6)-(10). The results of these regressions are provided in Appendix E. The balanced cross-sectional dataset has 600 observations, while the balanced panel dataset has 2,400 observations. All results are presented with robust standard errors.

The balanced panel specifications, using fixed effects for countries and time, find coefficients for CD_KS_HOF, CD_TW_HOF and CD_ESSEVS that are significantly different from zero at a 1-percent level. The estimates for CD_TW_ING and CD_KS_ING are significantly different from zero at a 5-percent level. The coefficients for independent variables that are included as logarithms can be interpreted as elasticities, as a PPML model is applied (Santos Silva & Tenreyro, 2006). Specifications (1)-(4) show a significant negative estimate for the measures of cultural distance. A negative elasticity implies that an increase in cultural distance is associated with a decrease in the bilateral trade in services. The elasticity of CD_KS_HOF is estimated at -0.23, which is comparable to the estimate using cross-sectional data (specification 6). This means that a one percent increase in cultural distance is associated with a decrease in bilateral trade in services of around 0.23%, ceteris paribus. CD_TW_HOF gives an elasticity of -0.45, so that a one percent increase in cultural distance is expected to decrease bilateral trade by 0.45% approximately, ceteris paribus. This estimate is, again, comparable to the one using

[20] Using panel data, does not allow for the inclusion of fixed effects for country pairs, because this will lead to exclusion of the most important independent variable (cultural distance). Namely, because these measures of cultural distance are time-invariant.

cross-sectional data (specification 7). Studies using the Hofstede dimensions to construct a measure of cultural distance, like CD_KS_HOF and CD_TW_HOF, have also reported significant negative coefficients (Lankhuizen & De Groot, 2016; Liu et al., 2020; Harms & Shuvalova, 2020).

The estimated elasticities for CD_TW_ING and CD_KS_ING are much smaller in magnitude, at -0.08 and -0.04, respectively. This implies that a one percent increase in cultural distance is associated with a 0.04% or 0.08% decrease in bilateral trade in services, ceteris paribus. The cross-sectional specifications (8 and 9) report no significant coefficients for CD_TW_ING and CD_KS_ING.

Tadesse & White (2010a; 2010b) propose the use of the Inglehart-Welzel dimensions to construct a measure of cultural distance, like CD_TW_ING and CD_KS_ING. The authors estimate that a one percent increase in cultural distance decreases exports by around 0.29%, ceteris paribus. This estimate is much larger in magnitude than those estimated in specifications (3) and (4). This may be due to the sample that is considered, or the fact that this present analysis only investigates trade in services.

Lastly, the coefficient for CD_ESSEVS is estimated to be positive, using panel data (specification 5) and cross-sectional data (specification 10). This implies that when two countries are more culturally different, bilateral trade in services is expected to be higher. Specification (5) reports an elasticity of 0.10. This means that a one percent increase in cultural distance is expected to increase bilateral trade in services by 0.10%, ceteris paribus.

Overall, it can be concluded from specifications (1) until (10) that the effect of cultural distance on bilateral trade in services is most likely negative. This is in line with most current literature and confirms *hypothesis 1*. However, the estimates for CD_ESSEVS (specifications 5 and 10) show a positive coefficient, and specifications (8) and (9) report no significant coefficient. In addition, the magnitude of this effect differs quite strongly depending on which measure of cultural distance is applied. In addition, *Hypothesis 2* can be confirmed because the estimates differ most likely because of the cultural framework employed, rather than the method of calculation that is used. On the other hand, *hypothesis 3* can be rejected as the estimates for CD_TW_ING and CD_KS_ING differ significantly from those of CD_ESSEVS.

Control variables

Based on the panel specifications, one can consider whether the estimates for the control variables seem plausible and are in line with literature. As consistent with literature, having a common border positively affects the level of bilateral trade in services.[21] However, having a common official language seems to have no significant effect on the level of bilateral trade in services, contrary to what was suggested in the literature. A colonial link in only estimated to positively affect bilateral trade in services in specifications (3)-(5).[22] As described in literature, geographical distance is an important determinant for the level of bilateral trade (in services). According to specifications (1)-(5), a one percent increase in geographical distance is associated with a 0.57-0.65% decrease in the level of bilateral trade in services, ceteris paribus. These estimates are consistent with literature (Harms & Shuvalova, 2020). Furthermore, the estimates on institutional distance seem ambiguous among the five different specifications. Most previous studies report significant negative coefficients, this is only reported in specification (5). Lastly,

[21] Having a common border increases bilateral trade in services by around 20.4-29.6%. This is based on $(e^b - 1) * 100\%$.

[22] According to these specifications, having a common official language is associated with an increase in the bilateral trade in services of around 23.6-31.8%. This is based on $(e^b - 1) * 100\%$.

in accordance with literature, significant positive coefficients are estimated for the GDP of the exporting and importing country. The GDP of the exporting country has an elasticity of around -1.20, while the importing country has an elasticity around -0.70. This would mean that the GDP of the exporting country has a larger effect on the level of bilateral trade in services between the two countries.

Table 7.
Results for individual measures of cultural distance

The table below shows the regression results for specifications (1)-(5), using a panel dataset, applying fixed effects (for countries and time). The standard errors that are shown are robust standard errors. The dependent variable is bilateral trade in services, measured in dollars. For this analysis a PPML estimation was used. This means that coefficients of logarithmic variables can be interpreted as elasticities. Specification (1) applies CD_KS_HOF as the measure of cultural distance. Specification (2) uses CD_TW_HOF as the measure of cultural distance. Specification (3) applies CD_TW_ING as the measure of cultural distance. Specification (4) uses CD_KS_ING as the measure of cultural distance. Specification (5) uses CD_ESSEVS to measure cultural distance. Besides these differences, all specifications apply the same set of control variables, as listed in Appendix C. The R-squared of the five specifications are relatively comparable and lie around 0.89. This implies that around 89% of the variation in the dependent variable is explained by the variables that were incorporated in the regression. These regressions were executed using a balanced sample.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Bilateral trade	Bilateral trade	Bilateral trade	Bilateral trade	Bilateral trade
Log CD_KS_HOF	-0.225***				
	(0.0258)				
Log CD_TW_HOF		-0.447***			
		(0.0513)			
Log CD_TW_ING			-0.0810**		
			(0.0331)		
Log CD_KS_ING				-0.0416**	
				(0.0168)	
Log CD_ESSEVS					0.102***
					(0.0264)
Common border	0.187***	0.186***	0.259***	0.258***	0.244***
	(0.0483)	(0.0489)	(0.0509)	(0.0509)	(0.0535)
Common official language	-0.110*	-0.0769	0.0704	0.0664	0.0717
	(0.0645)	(0.0660)	(0.0677)	(0.0678)	(0.0684)
Colonial link	0.110	0.0588	0.273***	0.276***	0.212**
	(0.101)	(0.104)	(0.0963)	(0.0965)	(0.0891)
Log geographical distance	-0.655***	-0.654***	-0.569***	-0.572***	-0.619***
	(0.0351)	(0.0355)	(0.0376)	(0.0376)	(0.0375)
Log institutional distance	0.0570***	0.0575***	0.00180	0.00174	-0.0587***
	(0.0174)	(0.0173)	(0.0195)	(0.0194)	(0.0179)
Log GDP exporter	1.190***	1.190***	1.212***	1.212***	1.244***
	(0.235)	(0.239)	(0.217)	(0.217)	(0.207)
Log GDP importer	0.698*	0.699*	0.715*	0.715*	0.742**

	(0.382)	(0.384)	(0.376)	(0.376)	(0.369)
Constant	-25.19*	-24.87*	-27.03**	-27.04**	-28.24**
	(13.07)	(13.18)	(12.75)	(12.75)	(12.39)
County fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	2,400	2,400	2,400	2,400	2,400
R-squared	0.893	0.892	0.887	0.887	0.886

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2. Combined measures of cultural distance

Combining different measures of cultural distance may be logical because some literature suggests that the measures of cultural distance by Hofstede and Inglehart-Welzel are complementary. Therefore, three specifications are composed where the Hofstede dimensions are combined with the Inglehart-Welzel dimensions and/or the measure by Kaasa et al. (2016). The latter is done because the preliminary analysis showed quite a strong correlation between the measures using the Inglehart-Welzel dimensions and the measure by Kaasa et al. (2016). This was assumed to be due to the similar source of data, namely the EVS. This will be shown in specifications (11)-(13). These specifications are executed using panel data, incorporating fixed effects.

Specification (11) shows a negative coefficient for CD_KS_HOF that is statistically significantly different from zero at a 1-percent level. However, in this specification, the estimate for CD_TW_ING is no longer significant. It seems that CD_KS_HOF has adopted all cultural aspects that may explain the level of bilateral trade in services. The elasticity for CD_KS_HOF in specification (11) is very comparable in magnitude to the estimate in specification (1). Again, a one percent increase in cultural distance is associated with a 0.23% decrease in the level of bilateral trade in services, ceteris paribus.

Specification (12) shows again an elasticity of -0.23 for CD_KS_HOF, which is significant at a 1-percent level. In this specification, CD_ESSEVS has, again, a significant positive elasticity of around 0.10. In this case, cultural distance, as measured by the Hofstede dimensions, decreases bilateral trade, while cultural distance, as measured by the ESS and EVS, increases bilateral trade. Combining these coefficients, a one percent increase in cultural distance is associated with a decrease in bilateral trade in services of around -0.122%, ceteris paribus.[23] This may (partially) confirm the concern expressed by Kaasa et al. (2016), who stated that their measure (CD_ESSEVS) does not accurately represent the Hofstede dimensions. It seems obvious that both measures capture different aspects of cultural (dis)similarity.

The last specification combines three measures of cultural distance that are all based on a different cultural framework. Like specification (11) the measure based on the Inglehart-Welzel dimensions does not give a significant coefficient. The elasticity for CD_KS_HOF is slightly lower, around -0.21, but still clearly and significantly negative. Likewise, the estimated coefficient for CD_ESSEVS is still significantly positive and slightly larger. Combining the estimates of significant coefficients, a one percent increase in cultural distance is associated with a decrease in bilateral trade in services of around 0.103%, ceteris paribus.[24]

[23] Calculation: $-0.224\% + 0.102\% = -0.122\%$
[24] Calculation: $-0.213\% + 0.110\% = -0.103\%$

Reflecting on *hypothesis 4,* it seems that when the cultural distance measure based on the Hofstede dimensions is included the dimensions by Inglehart-Welzel do not add any explanatory power. Furthermore, it may be concluded that CD_KS_HOF and CD_ESSEVS are complementary, as CD_KS_HOF highlights the negative effect of cultural distance, while CD_ESSEVS captures the positive impact. Lastly, CD_TW_ING does not enrich this model, considering the current specifications. Literature suggested that a measure based on the Hofstede dimensions and a measure based on the Inglehart-Welzel dimensions may be valuable in combination with each other. However, the specifications presented in this section disagree with this. To conclude, the measures based on the Hofstede dimensions seem to be the only ones to meaningfully capture the negative effect of cultural dissimilarity on the level of bilateral trade in services.

Table 8.
Results for combined measures of cultural distance

The table below shows the regression results for specification (11)-(13), using a panel dataset, applying fixed effects (for countries and time). The standard errors that are shown are robust standard errors. The dependent variable is bilateral trade in services, measured in dollars. For this analysis a PPML estimation was used. This means that coefficients of logarithmic variables can be interpreted as elasticities. Specification (11) applies CD_KS_HOF and CD_TW_ING as the measures of cultural distance. Specification (12) uses CD_KS_HOF and CD_ESSEVS as the measures of cultural distance. Specification (13) applies CD_KS_HOF, CD_TW_ING and CD_ESSEVS as the measures of cultural distance. Besides these differences, all specifications apply the same set of control variables, as listed in Appendix C. The R-squared of the five specifications are relatively comparable and lie between 0.89 and 0.90. This implies that around 89-90% of the variation in the dependent variable is explained by the variables that were incorporated in the regression.

	(11)	(12)	(13)
VARIABLES	Bilateral trade	Bilateral trade	Bilateral trade
Log CD_KS_HOF	-0.221***	-0.224***	-0.213***
	(0.0252)	(0.0265)	(0.0254)
Log CD_TW_ING	-0.0153		-0.0474
	(0.0312)		(0.0317)
Log CD_ESSEVS		0.102***	0.110***
		(0.0254)	(0.0259)
Common border	0.188***	0.168***	0.167***
	(0.0484)	(0.0490)	(0.0489)
Common official language	-0.106*	-0.103	-0.0894
	(0.0634)	(0.0631)	(0.0610)
Colonial link	0.123	0.106	0.142
	(0.109)	(0.0974)	(0.102)
Log geographical distance	-0.651***	-0.693***	-0.685***
	(0.0342)	(0.0347)	(0.0339)
Log institutional distance	0.0606***	0.0220	0.0306

	(0.0208)	(0.0201)	(0.0224)
Log GDP exporter	1.188***	1.206***	1.202***
	(0.235)	(0.226)	(0.225)
Log GDP importer	0.696*	0.711*	0.708*
	(0.381)	(0.376)	(0.377)
Constant	-25.13*	-25.60**	-25.41**
	(13.06)	(12.80)	(12.82)
Country fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Observations	2,400	2,400	2,400
R-squared	0.894	0.896	0.896

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3. Discussion: limitations and robustness checks

Some limitations can be pointed out with respect to the setup and execution of this empirical analysis. Firstly, panel data were only available for a share of the variables in this analysis. For instance, panel data were unavailable for the measures of cultural distance. Secondly, the year for which data were retrieved diverges over the variables. This means that variables originating from different years were combined for each observation. However, these two points of critique may not be as alarming, considering that cultural dimensions are very slow to change (Kandogan, 2016). Also, the geographical variables are the only variables, apart from the measures of cultural distance, for which no panel data was available. It seems obvious that these types of variables (e.g. geographical distance, common border, common official language) do not vary over time. Thus, the limited availability of panel data may have affected the results only slightly.

Another point of concern may be the availability of data for certain types of countries. The measure developed by Kaasa et al. (2016) only considers European countries. This means that creating a balanced dataset leads to the omission of all non-European countries. It may be argued that this is a too limited sample to grasp the effect of cultural difference on bilateral trade in service since most European countries have similar cultures. As a robustness check and to investigate the severity of this issue, Table F1 (Appendix F) provides estimates for specifications (1)-(4), using a sample that was only balanced based on the cultural distance measures using the Hofstede dimensions and Inglehart-Welzel dimensions. This results in a larger dataset including non-European countries as well. In addition, two additional control variables are included in these specifications. First, a dummy is included on whether nations belong to the same country, e.g. Aruba and the Antilles. Secondly, a dummy is included on whether countries are in a common economic union.[25] Table F1 shows that the estimates for the measures of cultural distance depend strongly on the sample that is selected. Using a larger sample, of around 12,400 observations, the estimates for the cultural distance measures based on the Inglehart-Welzel dimensions (CD_TW_ING and CD_KS_ING) are no longer significant. Furthermore, the estimates for the cultural distance measures based on the Hofstede dimensions (CD_KS_HOF and

[25] For the empirical analysis, a variable was constructed on whether two countries are in the same economic union. To enable this, data were collected on members of various economic unions. These include the European Union (EU), the Schengen Area, the European Economic Area (EEA), the European Free Trade Association (EFTA), the Eurasian Economic Union (EEAU), the Association of Southeast Asian Nations (ASEAN), and the Economic Community of West African States (ECOWAS) (Ministerie van Binnenlandse Zaken, 2021; ecowas.int, 2021; eaeunion.org, n.d; asean.org, n.d.).

CD_TW_HOF) have shrunk significantly in magnitude. The estimated coefficients for the two additional control variables are significant and, as expected, have a positive effect on the level of bilateral trade in services. It may be the case that the findings on the cultural distance measures are a result of outliers. These outliers would, for instance, entail country pairs that have a high level of bilateral trade in services and a large cultural distance, which is theoretically counterintuitive. This would bias the coefficients upwards. Therefore, this regression was repeated after trimming the outliers.[26] The findings of these regressions are reported in Table F2 (Appendix F). Doing this makes the estimates for CD_KS_HOF and CD_TW_HOF slightly more negative, compared to Table F1. However, the estimates for CD_TW_ING and CD_KS_ING are now significantly positive. Overall, it can be concluded that the results in this study are sensitive to the balanced sample that was selected. Thus the findings of this research should only be adopted and interpreted in a European context.

One may also be curious what the role of the selection of control variables is on the estimated coefficients for cultural distance. For instance, the choice was made to include GDP and exclude GDP per capita and institutional quality. As a robustness check, specifications (1)-(5) were estimated including GDP per capita/institutional quality in addition to GDP. However, doing this does not change the estimated coefficients for the cultural distance measures.

Most literature has included cultural and institutional distance in a linear form instead of using a logarithmic transformation, which was done in this analysis. Therefore, it seems valuable to check how robust the findings of this analysis are to this transformation. Table F3 (Appendix F) provides the results for specifications (1)-(5) with cultural and institutional distance in a linear form. To be able to compare the estimates for the different measures of cultural distance, these have been standardized. The R-squared does not change significantly comparing Table 7 and Table F3. CD_KS_HOF and CD_TW_HOF still report negative coefficients that are significant at a 1-percent level. According to specification (1*), increasing cultural distance by one standard deviation is associated with a decrease in bilateral trade in services by approximately 20.3%, ceteris paribus.[27] The estimates for CD_TW_HOF and CD_ESSEVS are now comparable in magnitude, where a one standard deviation increase in cultural distance is expected to decrease bilateral trade in services by around 17%, ceteris paribus.[28] Interestingly, the estimate for CD_ESSEVS is now significantly negative (at a 1-percent level), while in all other specifications this estimate was positive. In addition, the estimates for CD_TW_ING and CD_KS_ING are no longer significant.

Furthermore, Lankhuizen & De Groot (2016) suggest that there exists a non-linear relationship between cultural distance and the level of bilateral trade. Therefore, a non-linear version of all specifications was investigated, by including a quadratic term of cultural distance. However, a non-linear relationship could not be detected. Most estimates for the squared terms were insignificant and the estimates for the regular cultural distance term did not change significantly. Overall, it can be concluded that the estimates for the cultural distance measures are very sensitive to the specification that is chosen for the cultural distance variables.

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[26] This entailed dropping the observations based on the 95% interval of the following variables: bilateral trade, CD_KS_HOF, CD_TW_HOF, CD_TW_ING, CD_KS_ING.

[27] Calculation: $(e^{-0.227} - 1) * 100 = -20.3\%$

[28] Calculation: $(e^{-19} - 1) * 100 = -17.3\%$

5. Conclusion

Tangible and intangible barriers are believed to inhibit trade (in services) between nations. The literature considers cultural distance as a prominent intangible barrier. Cultural distance is defined as the degree to which standard norms and values diverge between two nations. This study has investigated the effect of different measures of cultural distance on the level of bilateral trade in services. Previous studies have mostly estimated a significant negative effect of cultural distance on bilateral trade, applying the measures based on the Hofstede dimensions and the Inglehart-Welzel dimensions. However, to my knowledge, no study has yet looked at the difference in estimates for the various measures of cultural distance, in an otherwise identical specification. In addition, there are few studies that have empirically tested the relationship between the measure of cultural distance developed by Kaasa et al. (2016) and trade flows. Data on cultural dimensions and control variables were used to estimate multiple specifications of the gravity equation, using PPML with fixed effects for countries and time.

Some conclusions can be drawn from the results of the analysis. First, the results most likely confirm the existence of a negative relationship between cultural distance and the level of bilateral trade in services. However, this was not found when the measure developed by Kaasa et al. (2016), based on the ESS and EVS, was applied in this study.[29] Secondly, the results confirm that the cultural framework and/or dimensions applied are more determinative of the outcome than the method of calculation. This was shown by the similar estimates for the two measures using the Hofstede dimensions and the comparable results of the two measures using the Inglehart-Welzel map. Both pairs of measures only differed in their method of calculation. Thirdly, despite the similarity in sources, the measure by Kaasa et al. (2016), using the ESS and EVS, does not offer similar results to the measures using the Inglehart-Welzel dimensions. Lastly, combining the measures for cultural distance revealed that the measures based on the Hofstede dimensions are the only measures that clearly articulate a negative effect of cultural dissimilarity on trade. The robustness analysis showed that the Hofstede dimensions is the only framework to report consistent negative coefficients over different specifications.

Overall, this study has shown that the choice of a measure to capture cultural distance is very important to the estimate of this variable as well as for the estimates of the other variables in the specification. The estimates for the measures based on the Inglehart-Welzel dimensions are mostly insignificant or very small in magnitude, while the measure by Kaasa et al. (2016) failed to capture the same aspects as expressed by the Hofstede dimensions. Hence, the measure developed by Kogut & Singh, based on the Hofstede dimensions, seems to be the most complete and accurate measure of cultural distance that is currently available. In terms of future research, it would be valuable to investigate the estimates for the cultural distance measures with more recent data on the cultural dimensions. In addition, having panel data for these measures of cultural distance would provide opportunities to further analyze the dynamics of these measures. However, it has been argued in literature that country scores for cultural dimensions are very slow to change. Hence, it is unclear whether panel data on cultural dimensions would really provide new insights. To conclude, the choice of a measure of cultural dissimilarity is essential to what will be inferred on the relationship between cultural distance and the level of bilateral trade in services.

[29] Except when using the non-logarithmic specification.

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7. Appendices

7.1. Appendix A: Variable list

Table A1. Variable list

Variable name	Abbreviation	Variable from source	Description	Sample, years for which data were retrieved
Dependent variables				
Bilateral trade	BT	Balanced trade in services (export) in millions of US dollars (oecd.org, 2024)	Bilateral trade is measured in millions of US dollars, converted for the exchange rate. Table A2 provides an overview of which services are considered.	All countries, for 2014, 2016, 2018 and 2020 (panel)
Independent variables: measure for cultural distance				
Cultural distance by Kogut & Singh, using Hofstede's dimensions	CD_KS_HOF	Dimension data matrix (geerthofstede.com, 2015)	The cultural distance was calculated using data on the four Hofstede dimensions and two additional WVS dimensions.	Most countries, 2015 version of dataset (cross-sectional)
Cultural distance by Kogut & Singh, using Inglehart-Welzel map	CD_KS_ING	WVS cultural map (worldvaluesurvey.org, 2023)	The cultural distance was calculated based on the Inglehart-Welzel map (version of 2023) values.	Most countries, data from 2017-2022, 2023 version of dataset (cross-sectional)
Cultural distance by Tadesse & White, using Inglehart-Welzel map	CD_TW_ING	WVS cultural map (worldvaluesurvey.org, 2023)	The cultural distance was calculated based on the Inglehart-Welzel map (version of 2023) values.	Most countries, data from 2017-2022, 2023 version of dataset (cross-sectional)
Cultural distance by Tadesse & White, using Hofstede's dimensions	CD_TW_HOF	Dimension data matrix (geerthofstede.com, 2015)	The cultural distance was calculated using data on the four Hofstede dimensions and two additional WVS dimensions. These dimensions have been standardized for this analysis.	Most countries, 2015 version of dataset (cross-sectional)
Cultural distance by Kaasa et al.	CD_ESSEVS	ESS/EVS-based Cultural Distance Indices (Kaasa et al., 2016)	The cultural distance was calculated using data from the ESS and EVS.	European countries, 2008 (cross-sectional)
Independent variables: control variables for pairs of countries				
Common border	COM_BOR	Contig (Mayer & Zignago, 2011)	Dummy indicating whether a pair of countries share a common border/are contiguous.	225 countries, 2011 (cross-sectional)
Common official language	COM_LANG_OFF	Comlang_off (Mayer & Zignago, 2011)	Dummy indicating whether a pair of countries has an official language in common.	225 countries, 2011 (cross-sectional)
Common language	COM_LANG	Comlang_ethno (Mayer & Zignago, 2011)	Dummy indicating whether a pair of countries has a common language that is	225 countries, 2011 (cross-sectional)

			spoken by at least 9% of their population.	
Colonial link	COL_LINK	Colony (Mayer & Zignago, 2011)	Dummy indicating whether a pair of countries has a colonial link.	225 countries, 2011 (cross-sectional)
Same country	SAME	Smcrty (Mayer & Zignago, 2011)	Dummy indicating whether a pair of countries belongs to the same country (e.g. Aruba and Antilles).	225 countries, 2011 (cross-sectional)
Geographical distance	GEO_DIST	Dist (Mayer & Zignago, 2011)	Geographical distance between two countries measured from the most important cities/agglomerations in terms of population. Measured in kilometers.	225 countries, 2011 (cross-sectional)
Geographical distance capitals	GEO_DIST_CAP	Distcap (Mayer & Zignago, 2011)	Geographical distance between two countries measured from their capitals. Measured in kilometers.	225 countries, 2011 (cross-sectional)
Common economic union	COM_ECO_UN		Based on dummies indicating whether a country (see table A2) we determine whether a pair of countries are part of the same economic union.	All countries, 2018 (cross-sectional)
Institutional distance	INST_DIST		Calculated using the Kauffman indices.	Most countries, for 2014, 2016, 2018 and 2020 (panel)
Independent variables: control variables for individual countries (each pair has a value for country i and j)				
GDP	GDP	GDP (worldbank.org, 2023)	The Gross Domestic Product in current US dollars.	All countries, for 2014, 2016, 2018 and 2020 (panel)
GDP per capita	GDP_CAP	GDP per capita (worldbank.org, 2022)	The Gross Domestic Product per capita in current US dollars.	All countries, for 2014, 2016, 2018 and 2020 (panel)
Population size	POP_SIZE	Population, total (worldbank.org, 2022)	The total population size.	All countries, for 2014, 2016, 2018 and 2020 (panel)
Stock of international migrants	MIGRANTS	International migrant stock (% of population) (worldbank.org, 2019)	Percentage of the population that is an international migrant.	Most countries, 2015 (cross-sectional0
Institutional quality	INST_QUA		Institutional quality based on the average of the six Kaufmann indices, as listed below.	Most countries, for 2014, 2016, 2018 and 2020 (panel)
Control of corruption	CON_COR	Control of corruption: estimate (worldbank.org, n.d.)	This index is part of Kaufmann indices/Worldwide	Most countries, for 2014, 2016,

			Governance Indicators. It is an indicator that shows the perception of the extent to which public power is can be used for private gain. The estimate captures a country's score on aggregate, on a standard normal distribution, ranging between -2.5 and 2.5.	2018 and 2020 (panel)
Rule of law	RUL_LAW	Rule of law: estimate (worldbank.org, n.d.)	This index is part of Kaufmann indices/Worldwide Governance Indicators. It is an indicator that shows the perception of the extent to which people have trust in and obey the societal rules. The estimate captures a country's score on aggregate, on a standard normal distribution, ranging between -2.5 and 2.5.	Most countries, for 2014, 2016, 2018 and 2020 (panel)
Regulatory quality	REG_QUA	Regulatory Quality: estimate (worldbank.org, n.d.)	This index is part of Kaufmann indices/Worldwide Governance Indicators. It is an indicator that shows the perception of the ability to form and implement policies and regulation that help the private sector to develop. The estimate captures a country's score on aggregate, on a standard normal distribution, ranging between -2.5 and 2.5.	Most countries, for 2014, 2016, 2018 and 2020 (panel)
Government effectiveness	GOV_EFF	Government Effectiveness: estimate (worldbank.org, n.d.)	This index is part of Kaufmann indices/Worldwide Governance Indicators. It is an indicator that shows the perception of the quality of public services/credibility of the government's commitments/etc.. The estimate captures a country's score on aggregate, on a standard normal distribution, ranging between -2.5 and 2.5.	Most countries, for 2014, 2016, 2018 and 2020 (panel)

Political stability and absence of violence/terrorism	POL_STAB	Political Stability and Absence of Violence/Terrorism: estimate (worldbank.org, n.d.)	This index is part of Kaufmann indices/Worldwide Governance Indicators. It is an indicator that shows the perception of the probability of political instability/political violence (terrorism). The estimate captures a country's score on aggregate, on a standard normal distribution, ranging between -2.5 and 2.5.	Most countries, for 2014, 2016, 2018 and 2020 (panel)
Voice and accountability	VOI_ACC	Voice and Accountability: estimate (worldbank.org, n.d.)	This index is part of Kaufmann indices/Worldwide Governance Indicators. It is an indicator that shows the perception of the extent to which the population can participate in selecting the government/freedom of expression (free media etc.). The estimate captures a country's score on aggregate, on a standard normal distribution, ranging between -2.5 and 2.5.	Most countries, for 2014, 2016, 2018 and 2020 (panel)

Table A2. A list of economic unions

Economic Unions				
European Economic Area	EEA	List of EEA countries (Ministerie van Binnenlandse Zaken, 2021)	A dummy indicating whether a country is part of the EEA	All countries, 2018
European Union	EU	List of EU countries (Ministerie van Binnenlandse Zaken, 2021)	A dummy indicating whether a country is part of the EU	All countries, 2018
Schengen area	Schengen	List of the Schengen area countries (Ministerie van Binnenlandse Zaken, 2021)	A dummy indicating whether a country is part of the Schengen area	All countries, 2018
European Free Trade Association	EFTA	List of EFTA countries (Ministerie van Binnenlandse Zaken, 2021)	A dummy indicating whether a country is part of the EFTA	All countries, 2018
Eurasian Economic Union	EEAU	Members (eaeunion.org, n.d.)	A dummy indicating whether a country is part of the EEAU	All countries, 2018

Association of Southeast Asian Nations	ASEAN	ASEAN member states (asean.org, n.d.)	A dummy indicating whether a country is part of the ASEAN	All countries, 2018
Economic Community of West African States	ECOWAS	ECOWAS member states (ecowas.int, 2021)	A dummy indicating whether a country is part of the ECOWAS	All countries, 2018

Table A3. List of service categories

Type of service	Code
Manufacturing services on physical inputs owned by others	SA
Maintenance and repair services n.i.e.	SB
Transport	SC
Travel	SD
Construction	SE
Insurance and pension services	SF
Financial services	SG
Charges for the use of intellectual property, n.i.e.	SH
Telecommunications, computer, and information services	SI
Other business services	SJ
Personal, cultural, and recreational services	SK
Government goods and services, n.i.e.	SL

7.2. Appendix B: Correlation analysis of control variables

Table B1. Correlation matrix of the ‘COM_LANG_OFF’ and ‘COM_LANG’

	COM_LANG_OFF	COM_LANG
COM_LANG_OFF	1.000	
COM_LANG	0.7636***	1.000

Table B2. Correlation matrix of the ‘Log_GDP, ‘Log_GDP_CAP, ‘Log_POP_SIZE’ ‘INST_QUA’

	Log_GDP	Log_GDP_CAP1	Log_POP_SIZE	Log_INST_QUA
Log_GDP	1.000			
Log_GDP_CAP	0.4655***	1.000		
Log_POP_SIZE	0.7883***	-0.1775***	1.000	
Log_INST_QUA	0.2667***	0.8101***	-0.266***	1.000

Table B3. Correlation matrix of the ‘GEO_DIST and ‘GEO_DIST_CAP’

	Log_GEO_DIST	Log_GEO_DIST_CAP
Log_GEO_DIST	1.000	
Log_GEO_DIST_CAP	0.9994***	1.000

*** significant at a 1% level
** significant at a 5% level
* significant at a 10% level

7.3. Appendix C: Regression specifications

Table C1. Main regression specifications

	Type	Dependent variable	Measure CD	Control variables	FE
1	Panel, balanced	$BT_{ij,t}$ (bilateral trade)	CD_KS_HOF	All in Table C2	Country and time
2	Panel, balanced	$BT_{ij,t}$ (bilateral trade)	CD_TW_HOF	All in Table C2	Country and time
3	Panel, balanced	$BT_{ij,t}$ (bilateral trade)	CD_TW_ING	All in Table C2	Country and time
4	Panel, balanced	$BT_{ij,t}$ (bilateral trade)	CD_KS_ING	All in Table C2	Country and time
5	Panel, balanced	$BT_{ij,t}$ (bilateral trade)	CD_ESSEVS	All in Table C2	Country and time
6	Cross-sectional, balanced	BT_{ij} (bilateral trade)	CD_KS_HOF	All in Table C2	Country
7	Cross-sectional	BT_{ij} (bilateral trade)	CD_TW_HOF	All in Table C2	Country
8	Cross-sectional, balanced	BT_{ij} (bilateral trade)	CD_TW_ING	All in Table C2	Country
9	Cross-sectional, balanced	BT_{ij} (bilateral trade)	CD_KS_ING	All in Table C2	Country
10	Cross-sectional, balanced	BT_{ij} (bilateral trade)	CD_ESSEVS	All in Table C2	Country
11	Panel	$BT_{ij,t}$ (bilateral trade)	CD_KS_HOF, CD_TW_ING	All in Table C2	Country and time
12	Panel	$BT_{ij,t}$ (bilateral trade)	CD_KS_HOF, CD_ESSEVS	All in Table C2	Country and time
13	Panel	$BT_{ij,t}$ (bilateral trade)	CD_KS_HOF, CD_TW_ING, CD_ESSEVS	All in Table C2	Country and time

Table C2. List of control variables

Control variables
- COM_BOR (common border) - COM_LANG_OFF (common language, official) - COL_LINK (colonial link) - Log_GEO_DIST (log geographical distance) - Log_INST_DIST (institutional distance) - Log_GDP1 (log GDP country 1) - Log_GDP2 (log GDP country 2)

7.4. Appendix D: Additional summary statistics

Table D1.
Additional descriptive statistics of balanced sample

This table provides additional descriptive statistics, including the number of observations, the mean, standard deviation, minimum, and maximum for the following variables. To start, the non-logarithmic version of the cultural distance measures, geographical distance, GDP, institutional distance. In addition, it provides the descriptive statistics of the variables that have been omitted due to the correlation analysis that was performed. These include geographical distance of capitals, GDP per capita, population size, common language and institutional quality. Lastly, it includes the descriptive statistics of the percentage of migrants and the dummy on common economic union. These are not applied in the main specifications but will be used in the robustness analysis (albeit with a larger sample). It should be noted that these summary statistics are based on the balanced dataset.

VARIABLES	N	mean	sd	min	max
CD_KS_HOF	2,400	2.004	1.389	0.0653	8.299
CD_TW_HOF	2,400	3.184	1.156	0.452	6.994
CD_TW_ING	2,400	1.607	0.890	0.121	3.777
CD_KS_ING	2,400	1.331	1.200	0.00691	5.263
CD_ESSEVS	2,400	1.733	1.497	0.0299	7.524
Geographical distance	2,400	1,359	708.8	80.98	3,913
Geographical distance, capitals	2,400	1,354	709.4	80.98	3,913
Institutional distance	2,400	0.866	1.138	0.00739	6.607
GDP	2,400	7.221e+11	9.823e+11	2.407e+10	3.974e+12
GDP per capita	2,400	35,132	22,287	7,571	97,667
Population size	2,400	2.315e+07	3.340e+07	1.315e+06	1.445e+08
Institutional quality	2,400	1.010	0.596	-0.755	1.835
Common language	2,400	0.0267	0.161	0	1
Common economic union	2,400	0.840	0.367	0	1
Migrants (%)	2,400	0.108	0.0593	0.0143	0.294

7.5. Appendix E: Regression results cross-sectional specifications

Table E1.
Results for cross-sectional data

The table below show the regression results for specification (6)-(10), using a cross-sectional dataset, with only fixed effects for countries (not time). The standard errors that are shown are robust standard errors. The dependent variable is bilateral trade in services, measured in dollars. For this analysis a PPML estimation was used. This means that coefficients of logarithmic variables can be interpreted as elasticities. Specification (6) applies CD_KS_HOF as the measure of cultural distance. Specification (7) uses CD_TW_HOF as the measure of cultural distance. Specification (8) applies CD_TW_ING as the measure of cultural distance. Specification (9) uses CD_KS_ING as the measure of cultural distance. Specification (10) uses CD_ESSEVS to measure cultural distance. Besides these differences, all specifications apply the same set of control variables, as listed in Appendix

C. The R-squared of the five specifications are relatively comparable and lie between 0.90 and 0.91. This implies that around 90-91% of the variation in the dependent variable is explained by the variables that were incorporated in the regression.

VARIABLES	(6) Bilateral trade	(7) Bilateral trade	(8) Bilateral trade	(9) Bilateral trade	(10) Bilateral trade
Log CD_KS_HOF	-0.234***				
	(0.0469)				
Log CD_TW_HOF		-0.452***			
		(0.0939)			
Log CD_TW_ING			-0.0785		
			(0.0658)		
Log CD_KS_ING				-0.0403	
				(0.0331)	
Log CD_ESSEVS					0.119**
					(0.0514)
Common border	0.157*	0.159*	0.228**	0.227**	0.204**
	(0.0909)	(0.0932)	(0.0973)	(0.0972)	(0.103)
Common official language	-0.0699	-0.0313	0.123	0.120	0.143
	(0.119)	(0.126)	(0.133)	(0.133)	(0.133)
Colonial link	0.121	0.0729	0.307	0.309*	0.269
	(0.204)	(0.211)	(0.187)	(0.188)	(0.170)
Log geographical distance	-0.657***	-0.652***	-0.565***	-0.568***	-0.608***
	(0.0680)	(0.0696)	(0.0732)	(0.0735)	(0.0733)
Log institutional distance	0.0577*	0.0555*	-0.00461	-0.00477	-0.0819**
	(0.0328)	(0.0325)	(0.0417)	(0.0413)	(0.0346)
Log GDP exporter	0.613***	0.612***	0.610***	0.612***	0.651***
	(0.0794)	(0.0779)	(0.0931)	(0.0927)	(0.0902)
Log GDP importer	0.732***	0.730***	0.729***	0.731***	0.762***
	(0.0773)	(0.0758)	(0.0876)	(0.0874)	(0.0870)
Constant	-10.62***	-10.17***	-11.25***	-11.36***	-12.93***
	(3.143)	(3.143)	(3.739)	(3.723)	(3.704)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	No	No	No	No	No
Observations	600	600	600	600	600
R-squared	0.906	0.904	0.900	0.900	0.901

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7.6. Appendix F: Robustness analyses

This appendix shows additional regressions that serves as a robustness analysis to the regressions that were presented in sections 4.1 and 4.2.

Table F1.
Results for a larger sample with additional control variables

The table below shows the regression results for specifications (1)-(4), using a larger sample, using panel data with fixed effects. The standard errors that are shown are robust standard errors. The dependent variable is bilateral trade in services, measured in dollars. For this analysis a PPML estimation was used. This means that coefficients of logarithmic variables can be interpreted as elasticities. Specification (1) applies CD_KS_HOF as the measure of cultural distance. Specification (2) uses CD_TW_HOF as the measure of cultural distance. Specification (3) applies CD_TW_ING as the measure of cultural distance. Specification (4) uses CD_KS_ING as the measure of cultural distance. All specifications apply the same set of control variables, as listed in Appendix C. In addition, same and common economic union are added as control variables. The R-squared of the five specifications are relatively comparable and lie between 0.87 and 0.88. This implies that around 87-88% of the variation in the dependent variable is explained by the variables that were incorporated in the regression.

	(1*)	(2*)	(3*)	(4*)
VARIABLES	Bilateral trade	Bilateral trade	Bilateral trade	Bilateral trade
Log CD_KS_HOF	-0.0795***			
	(0.0196)			
Log CD_TW_HOF		-0.183***		
		(0.0392)		
Log CD_TW_ING			0.00505	
			(0.0216)	
Log CD_KS_ING				0.00320
				(0.0109)
Common border	0.197***	0.199***	0.197***	0.197***
	(0.0449)	(0.0450)	(0.0462)	(0.0462)
Common official language	0.236***	0.227***	0.325***	0.325***
	(0.0507)	(0.0511)	(0.0541)	(0.0542)
Colonial link	-0.00902	-0.0214	-0.00703	-0.00743
	(0.0514)	(0.0521)	(0.0507)	(0.0507)
Same	0.718***	0.716***	0.731***	0.731***
	(0.0803)	(0.0793)	(0.0861)	(0.0863)
Log geographical distance	-0.493***	-0.490***	-0.513***	-0.513***
	(0.0147)	(0.0147)	(0.0141)	(0.0140)
Common economic union	0.366***	0.368***	0.346***	0.346***
	(0.0485)	(0.0484)	(0.0487)	(0.0488)
Log institutional distance	0.0339***	0.0363***	0.0189*	0.0186*
	(0.0100)	(0.0101)	(0.0114)	(0.0112)
Log GDP exporter	0.775***	0.774***	0.777***	0.777***
	(0.143)	(0.143)	(0.145)	(0.145)
Log GDP importer	0.615***	0.615***	0.615***	0.615***

	(0.197)	(0.197)	(0.203)	(0.203)
Constant	-14.90**	-14.75**	-14.77*	-14.76*
	(7.302)	(7.267)	(7.539)	(7.543)
Country fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	12,431	12,431	12,431	12,431
R-squared	0.875	0.876	0.871	0.871

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table F2.

Results for a larger sample with additional control variables, excluding outliers

The table below shows the regression results for specifications (1)-(4), using a larger panel dataset excluding outliers (based on a 95% interval), applying fixed effects. The standard errors that are shown are robust standard errors. The dependent variable is bilateral trade in services, measured in dollars. For this analysis a PPML estimation was used. This means that coefficients of logarithmic variables can be interpreted as elasticities. Specification (1) applies CD_KS_HOF as the measure of cultural distance. Specification (2) uses CD_TW_HOF as the measure of cultural distance. Specification (3) applies CD_TW_ING as the measure of cultural distance. Specification (4) uses CD_KS_ING as the measure of cultural distance. All specifications apply the same set of control variables, as listed in Appendix C. In addition, same and common economic union are added as control variables. The R-squared of the five specifications are relatively comparable and are around 0.80. This implies that around 80% of the variation in the dependent variable is explained by the variables that were incorporated in the regression.

	(1*)	(2*)	(3*)	(4*)
VARIABLES	Bilateral trade	Bilateral trade	Bilateral trade	Bilateral trade
Log CD_KS_HOF	-0.0909***			
	(0.0227)			
Log CD_TW_HOF		-0.253***		
		(0.0425)		
Log CD_TW_ING			0.0705***	
			(0.0240)	
Log CD_KS_ING				0.0294**
				(0.0122)
Common border	0.141***	0.120**	0.134***	0.118**
	(0.0520)	(0.0517)	(0.0463)	(0.0468)
Common official language	0.192***	0.194***	0.237***	0.238***
	(0.0435)	(0.0430)	(0.0387)	(0.0389)
Colonial link	0.263***	0.268***	0.252***	0.257***
	(0.0472)	(0.0446)	(0.0447)	(0.0434)
Same	0.260**	0.248**	0.175	0.182
	(0.104)	(0.104)	(0.115)	(0.116)
Log geographical	-0.622***	-0.609***	-0.663***	-0.662***

distance				
	(0.0164)	(0.0163)	(0.0156)	(0.0154)
Common economic union	0.122***	0.151***	0.123***	0.121***
	(0.0396)	(0.0386)	(0.0373)	(0.0371)
Log institutional distance	0.0437***	0.0528***	0.0284***	0.0299***
	(0.00843)	(0.00853)	(0.00959)	(0.00948)
Log GDP exporter	0.767***	0.776***	0.793***	0.792***
	(0.103)	(0.103)	(0.102)	(0.101)
Log GDP importer	0.653***	0.660***	0.668***	0.664***
	(0.107)	(0.107)	(0.103)	(0.102)
Constant	-14.30***	-14.61***	-14.96***	-14.78***
	(4.088)	(4.110)	(4.010)	(3.967)
Country fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	11,538	11,548	11,553	11,545
R-squared	0.796	0.801	0.809	0.810

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table F3.
Results for linear cultural and institutional distance

The table below shows the regression results for specifications (1)-(5), using a panel dataset, applying fixed effects (for countries and time). The standard errors that are shown are robust standard errors. The dependent variable is bilateral trade in services, measured in dollars. For this analysis a PPML estimation was used. This means that coefficients of logarithmic variables can be interpreted as elasticities. However, in these specifications, cultural and institutional distance are included as standardized linear variables. Specification (1) applies CD_KS_HOF as the measure of cultural distance. Specification (2) uses CD_TW_HOF as the measure of cultural distance. Specification (3) applies CD_TW_ING as the measure of cultural distance. Specification (4) uses CD_KS_ING as the measure of cultural distance. Specification (5) uses CD_ESSEVS to measure cultural distance. Besides these differences, all specifications apply the same set of control variables, as described in Appendix C. The R-squared of the five specifications are relatively comparable and lie around 0.89. This implies that around 89% of the variation in the dependent variable is explained by the variables that were incorporated in the regression. These regressions were executed using a balanced sample.

	(1*)	(2*)	(3*)	(4*)	(5*)
VARIABLES	Bilateral trade	Bilateral trade	Bilateral trade	Bilateral trade	Bilateral trade
CD_KS_HOF	-0.227***				
	(0.0258)				
CD_TW_HOF		-0.194***			
		(0.0226)			
CD_TW_ING			-0.0557		
			(0.0422)		
CD_KS_ING				-0.0192	
				(0.0504)	

CD_ESSEVS					-0.187***
					(0.0351)
Common border	0.256***	0.215***	0.257***	0.263***	0.251***
	(0.0470)	(0.0479)	(0.0518)	(0.0520)	(0.0504)
Common official language	-0.0288	-0.0293	0.0717	0.0612	0.0704
	(0.0668)	(0.0675)	(0.0707)	(0.0718)	(0.0694)
Colonial link	0.0685	0.0449	0.247**	0.225**	0.201**
	(0.0989)	(0.104)	(0.0982)	(0.0959)	(0.0908)
Log geographical distance	-0.600***	-0.618***	-0.581***	-0.592***	-0.585***
	(0.0344)	(0.0344)	(0.0365)	(0.0369)	(0.0365)
Institutional distance	0.115***	0.103***	0.0109	-0.0240	0.0808**
	(0.0308)	(0.0301)	(0.0518)	(0.0587)	(0.0378)
Log GDP exporter	1.196***	1.200***	1.212***	1.217***	1.201***
	(0.225)	(0.232)	(0.217)	(0.216)	(0.215)
Log GDP importer	0.699*	0.705*	0.714*	0.720*	0.704*
	(0.378)	(0.381)	(0.378)	(0.376)	(0.377)
Constant	-26.00**	-26.10**	-26.98**	-27.21**	-26.52**
	(12.88)	(13.04)	(12.83)	(12.76)	(12.77)
County fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	2,400	2,400	2,400	2,400	2,400
R-squared	0.891	0.891	0.885	0.884	0.886

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1