Economic Clash? The Role of Cultural Cleavages in Bilateral Trade Relations

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Using a theory based gravity equation, we first show that cultural dissimilarity (similarity) negatively (positively) affects bilateral imports of countries. More importantly, we examine Huntington's the *Clash of Civilizations* hypothesis and provide evidence that the impact of cultural heterogeneity on trade flows is far more accentuated in the post-Cold War period than during the Cold War, a result that confirms Huntington's thesis from an economic standpoint. In the post-Cold War period, two countries that belong to different civilizations have 41 percent lower mean imports than those of the same civilization, whereas this effect is insignificant during the Cold War. Alternatively, in the post-Cold War epoch, the average bilateral imports of a country pair sharing the same majority religion, ethnicity and language are 76 percent higher than those that do not share the same heritages, whereas this effect is not significant in the Cold War era.

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I. Introduction

There is a widespread agreement on the importance of the role culture plays in economic interactions (Felbermayr and Toubal, 2010; Guiso et al., 2009; Rauch and Trindade, 2002). In this context, culture is considered to be a source of informational cost and/or a source of uncertainty that acts as a barrier in trade relations of countries. In this paper, we feed into this line of discussion and scrutinize the impact of civilizational/cultural dissimilarity/similarity on bilateral trade across countries and across time periods.

The first contribution of this study is to test whether cultural dissimilarity between countries is, by and large, a trade barrier. We do that by estimating a theory based gravity model of international trade and by using a comprehensive set of cultural variables that allow us to look at different aspects of culture. We start off with deriving our empirical specification from the well-established theory of gravity equations (see, for instance, Anderson and Van Wincoop, 2003; Baldwin and Taglioni, 2007). Subsequently, using data on bilateral imports from 1950 to 2006 as well as Huntington's (1998) typology of civilizations, we provide evidence that when two countries in a dyad are members of different civilizations their mean imports are up to 34 percent lower than that of two countries of the same civilization. Furthermore, we extend the analysis using Ellingsen's measure of religious, ethnic and linguistic fragmentation within countries. This data set provides us with majority religious groups, majority ethnic groups and majority linguistic groups in countries between 1945-1994[1], and hence, allows us to examine whether sharing a dominant cultural heritage such as religion, ethnicity or language has an impact on countries trade relations. We show that although the effect of sharing the same religion on bilateral trade flows is overall

1. The original data by Ellingsen (2000) have been extended up until 2001 by Gartzke and Gleditsch (2006).

positive, it does not maintain a persistent significance. On the other hand, when two countries in a dyad share the same ethnicity or the same language their trade relations are strongly improved upon. While two countries with the same dominant ethnicity have 38 percent higher mean imports, this figure increases to 58 percent for two countries sharing the same dominant language.

Parallel to the fact that this paper adds to the discussion on the relationship between culture and trade, its main contribution lies in a more specific issue. We examine Huntington's "The Clash of Civilizations?" hypothesis from an economic point of view. In his much acclaimed thesis, Huntington (1993a, 1993b, 1998, 2000) claims that the great divisions among humankind and the dominating source of conflict in the post-Cold War era will be cultural. He furthers his predictions by stating that the violent struggles among peoples will result as a consequence of the fault lines between civilizations at the micro level; however, at the macro level, states from different civilizations will compete for economic and political power (Huntington, 1993). Although the Clash of Civilizations in the post-Cold War hypothesis enticed a number of authors into testing it for conflicts and battles between countries (Chiozza, 2002; Gokmen, 2011; Henderson, 1997, 1998; Henderson and Tucker, 2001; Russett et al., 2000), the fact that Huntington's predictions also indicated an economic clash among countries remained overlooked and no author ever put it into rigorous testing. This is exactly the aim of the present paper. We probe Huntington's projections of an economic clash in the post-Cold War era from an economic standpoint. Our findings are in support of the Clash of Civilizations thesis. We provide evidence suggesting that there is a strong surge in economic clash in terms of trade relations across countries in the post-Cold War era compared to the Cold War era. Two countries that belong to different civilizations have 41 percent reduced mean imports in the post-Cold War period compared to two countries

of the same civilization, whereas this effect is insignificant during the Cold War. Alternatively, in the post-Cold War epoch, the average bilateral imports of a country pair sharing the same majority religion, the same majority ethnicity and the same majority language are 76 percent higher than a pair of countries that do not share the same heritages, whereas this effect is not significant in the Cold War era.

Our results are robust to alternative procedures of critical evaluation. Unlike some existing studies (Felbermayr and Toubal, 2010; Giuliano et al., 2006; Guiso et al., 2009; Rauch and Trindade, 2002), the data set we use not only contains European countries or a subset of the world, but the entire range of world countries. Moreover, we are careful to control for a large array of measures of geographic barriers as well as historical and policy related determinants of trade relations. One of the novelties of this paper compared to the existing geographic barriers literature is the use of terrain ruggedness as a barrier to trade. We show that augmented levels of terrain ruggedness strongly reduces mean imports between countries. Moreover, we include origin and destination fixed effects to account for the multilateral resistance terms as well as year fixed effects. We also cluster standard errors at the country pair level.

Additional sensitivity analysis are carried out to deal with the degree of sensitivity of our results to the inclusion of genetic distance into the regressions as an alternative measure of cultural distance, to taking into account zero-trade flows and to cross-sectional analyses. First, we show that our measures of culture survive the genetic distance variable, which means that we capture an element of culture that is not captured by genetic distance. Second, the evidence provided does not suffer from the omission of zero-trade flows and the conclusions still hold even after zero-trade flows are incorporated into the estimations. Third, cross-sectional analysis, by and large, props up previous findings. One cue to

derive from cross-sectional analysis is that despite the general consensus on the end of the Cold War being 1991, the evidence suggests that the *de facto* end of the Cold War was somewhat earlier, between 1985-1990.

The paper proceeds as follows. Section II delivers a brief outline of where this study stands in the literature. Section III lays out the methodology and describes the data. Section IV provides baseline and main estimation results. Section V tests Huntington's "The Clash of Civilizations?" hypothesis. Section VI challenges the sensitivity and robustness of our results. Finally, Section VII concludes.

II. Related Literature

This study is part of the literature in political science on the *Clash of Civilizations* thesis. This strand of literature focused on militarized disputes aspect of the thesis and completely ignored what the economic implications could be. For instance, Russett et al. (2000) and Henderson and Tucker (2001) assess the incidents of militarized interstate disputes between countries during the periods 1950-92 and 1816-1992, respectively. They find that such traditional realist influences as contiguity, alliances and relative power as well as liberal influences of joint democracy and interdependence provide a much better account of interstate conflict involvement and that intercivilizational dyads are less, and not more, conflict prone. However, Huntington (2000) reacted to such studies criticizing time periods and claiming his predictions are valid in the post-Cold War era. As such, on a larger data set with a better coverage of the post-Cold War era, Gokmen (2011) provides evidence that even after controlling for geographic, political, military and economic factors, being part of different civilizations in the post-Cold War period brings about 71.2 percentage points higher probability of conflict than belonging to the same civilization, whereas it reduces the

probability of conflict by 25.7 percentage points during the Cold War.

In addition, this paper substantially contributes to the literature on trade and culture (see, for instance, Felbermayr and Toubal, 2010; Giuliano et al., 2006; Guiso et al., 2009; Melitz, 2008; Rauch and Trindade, 2002). Felbermayr and Toubal (2010) establish a correlation between culture and trade using scores from European Song Contest as a proxy for cultural proximity. Giuliano et al. (2006) question the validity of genetic distance as a proxy for cultural distance in explaining trade relations and show that genetic distance only captures geographic barriers that are reflected in transportation costs across Europe. Guiso et al. (2009), on the other hand, show that bilateral trust between pairs of European countries leads to higher trade between them. Melitz (2008) disentangles the channels of linguistic commonality and finds that ease of communication facilitates trade rather through the ability to communicate directly than through translation. Lastly, on a subset of world countries, Rauch and Trindade (2002) show the importance of ethnic Chinese networks in international trade by expediting matches between buyers and sellers and by generating better contract enforcement for international transactions.

This study is also part of the vast literature attempting to explain bilateral trade flows using gravity models. Gravity equation is one of the most successful in empirical economics. Simply put, it explains bilateral international trade flows with GDP, distance, and other factors that conduce to trade barriers. Despite several attempts to theoretically justify gravity equations (Anderson, 1979; Anderson and Van Wincoop, 2003; Baldwin and Taglioni, 2007; Bergstrand, 1985, 1989, 1990), its success lies in its strongly consistent empirical findings. There is a wide range of empirical studies investigating the relationship between international trade flows and border effects (McCallum, 1995), internal or/and external conflict (Blomberg and Hess, 2006; Glick and Taylor, 2010; Martin et

al., 2008; Rohner et al., 2011), currency unions (Glick and Rose, 2002; Rose, 2000; Rose and van Wincoop, 2001), General Agreements on Tariffs and Trade (GATT)/ World Trade Organization (WTO) (Rose, 2004), security of property rights and the quality of institutions (Anderson and Marcouiller, 2002; Berkowitz et al., 2006; de Groot et al., 2004; Nunn, 2007).[2]

Lastly, it is important to note that the recognition of the influence of cultural factors on social and economic phenomena is not new.[3] However, the curiosity in the field has been reignited only recently. In that respect, this study is partially related to a growing strand of literature on the impact of culture and institutions on social, political and economic outcomes (Algan and Cahuc, 2007; Barro and McCleary, 2003; Botticini and Eckstein, 2005; Fernandez and Fogli, 2007; Giuliano, 2007; Guiso et al., 2003, 2004, 2008a, 2008b; Ichino and Maggi, 2000; Knack and Keefer, 1997; Spolaore and Wacziarg, 2009a, 2009b; Tabellini, 2007, 2008a, 2008b).[4]

III. Methodology and Data

In this section, we first lay out the theoretical set up, and accordingly, derive the empirical specification to be estimated. Subsequently, we give a description of the data set used in the analysis.

2. For a recent survey of the literature on trade costs, see Anderson and Van Wincoop (2004). Anderson (2011) also provide a review of the recent developments in the gravity models literature.

3. Early seminal examples are Banfield (1958), Putnam (1993) and Weber (1958).

4. This list is not meant to be exhaustive. See, also, Fernandez (2007) and Guiso et al. (2006) for comprehensive surveys of the literature on the relation between culture and economic outcomes.

III.A. Methodology

One of the first authors who provided clear microfoundations for the gravity model is Anderson (1979).[5] More recently, Anderson and Van Wincoop (2003) showed that most of the estimated gravity equations do not have a theoretical foundation and, by providing a theoretical framework that can be easily estimated, the authors reestablished the validity of the theory . With their theoretical framework they also facilitated the estimation of key parameters in a theoretical gravity equation relating bilateral trade to size, to bilateral trade barriers and to multilateral resistance terms. Below we provide a sketch of the theoretical framework for we want to stay as close to the theory as possible when it comes to estimation. From the following theoretical setup we derive an empirical specification. What follows is largely based on Anderson and Van Wincoop (2003, 2004) and Baldwin and Taglioni (2007).

Assume only one single differentiated good is produced in each country. Preferences are of constant elasticity of substitution (CES) functional form. Let m_{ij} be the consumption by country j consumers of goods imported from country i. Accordingly, consumers in country j maximize:

$$\left[\sum_i \beta_i^{(1-\sigma)/\sigma} m_{ij}^{(\sigma-1)/\sigma}\right]^{\sigma/(\sigma-1)} \tag{1}$$

subject to the budget constraint:

5. Bergstrand (1985) is another early attempt to theoretically justify gravity equations. Anderson (1979) provides a theoretical foundation for the gravity model under perfect competition based on constant elasticity of substitution (CES) preferences and goods that are unique to their production origin and are imperfectly substitutable with other countries' goods. Further theoretical extensions- for instance, Bergstrand (1989, 1990)- have preserved the CES preference structure and added monopolistic competition or a Heckscher-Ohlin structure.

$$\sum_i p_{ij} m_{ij} = Y_j \tag{2}$$

where σ is the elasticity of substitution between goods, β_i is a positive distribution parameter, Y_j is the nominal expenditure of country j on imported goods, and p_{ij} is the price of country i goods inside the importing country j, also called the "landed price."

Then, from the maximization problem, the nominal import expenditure on country i good is given as a function of relative prices and income level:

$$p_{ij} m_{ij} = \left[\frac{\beta_i p_{ij}}{P_j}\right]^{(1-\sigma)} Y_j \tag{3}$$

where P_j is country $j's$ CES price index, that is:

$$P_j = \left[\sum_i \left(\beta_i p_{ij}\right)^{(1-\sigma)}\right]^{1/(1-\sigma)} \tag{4}$$

Prices differ among partner countries due to trade costs. The landed price in country j of country i good is linked to the exporter's supply price, p_i, and trade costs, τ_{ij}. Exporter in country i passes the bilateral trade costs on to the importer via the following pass-through equation:

$$p_{ij} = p_i \tau_{ij} \tag{5}$$

which renders the price index as follows: $P_j = \left[\sum_i \left(\beta_i p_i \tau_{ij}\right)^{(1-\sigma)}\right]^{1/(1-\sigma)}$. τ_{ij} is a factor that reflects all trade costs, natural and man-made, between

country i and country j. In addition to the transportation costs, these trade costs might reflect information costs, legal costs, regulatory and institutional costs, cost of business norms and all the remaining costs that altogether accrue up to bilateral trade barriers. This is where we see our cultural variable come into play as one of the bilateral trade barriers.

Denoting M_{ij} the value of imports, equation (3) combined with the pass-through equation of exporter's cost, (5), yields:

$$M_{ij} = \left[\frac{\beta_i p_i \tau_{ij}}{P_j}\right]^{(1-\sigma)} Y_j \tag{6}$$

Imposing market clearance guarantees that the total income from exports of country i should be equal to the sum of import expenditure on good i in each and every market. In symbols:

$$Y_i = \sum_j M_{ij} \tag{7}$$

which we can express as follows using the import expenditure equation, (6), for each country j :

$$Y_i = (\beta_i p_i)^{(1-\sigma)} \sum_j \left(\frac{\tau_{ij}}{P_j}\right)^{(1-\sigma)} Y_j, \forall i \tag{8}$$

If we solve for $\{\beta_i p_i\}^{(1-\sigma)}$, after multiplying both sides of equation (8) by world nominal income $\overline{Y} = \sum_i Y_i$, we get:

$$\{\beta_i p_i\}^{(1-\sigma)} = \frac{Y_i}{\overline{Y}\Omega_i^{1-\sigma}} \tag{9}$$

where $\Omega_i \equiv \left[\sum_j \left(\frac{\tau_{ij}}{P_j}\right)^{(1-\sigma)} \lambda_j\right]^{1/(1-\sigma)}$ and $\lambda_j \equiv \frac{Y_j}{\overline{Y}}$.

Using above equation (9) and substituting it into equation (6) we can acquire the value of imports as:

$$M_{ij} = \frac{Y_i Y_j}{\overline{Y}} \left(\frac{\tau_{ij}}{\Omega_i P_j}\right)^{(1-\sigma)} \tag{10}$$

This is our first-pass gravity equation. We impose that under symmetry ($\tau_{ij} = \tau_{ji}$) it can be shown that $\Omega_i = P_i$. Then, we can rearrange terms to make our gravity equation look similar to the gravitational force equation:[6]

$$M_{ij} = G\frac{Y_i Y_j}{\tau_{ij}^{\sigma-1}} \tag{11}$$

where $G \equiv \frac{1}{\overline{Y}} \left(\frac{1}{P_i P_j}\right)^{(1-\sigma)}$.

Our final expression of the gravity equation relates bilateral imports positively to the size of the countries and negatively to the trade barriers between countries (since $\sigma > 1$). Bilateral trade barriers, τ_{ij}, are also referred to as "bilateral resistance". As mentioned earlier, one of the bilateral resistance terms is our variable of cultural dissimilarity/similarity between countries. Moreover,

6. A reminder for the reader of the law of gravity:

$$Gravitational\ Force = G\frac{M_i M_j}{distance_{ij}^2}$$

where M_i and M_j are the masses of the two objects; $distance_{ij}$ is the distance between them and G is the gravitational constant.

it is important to notice that the G term bears the price indices of the two countries. Although, P_i and P_j are price indices in the model, they cannot be interpreted as price levels in general. These unobservable variables should be better thought of as nonpecuniary trade costs a country has with all its trading partners. Hence, P_i and P_j represent average trade barriers of country i and country j, respectively, which we refer to as "multilateral resistance" terms following Anderson and Van Wincoop (2003).[7]

A common practice in the empirical literature is to work with the average of the two-way imports, the average of country i imports to country j and country j imports to country i. With no reference to the theory, averaging is done before log-linearizing, instead of after. This is a simple, though common, error, and, as shown by Baldwin and Taglioni (2007), it leads to biased estimates, especially so for countries with unbalanced trade.

Fortunately, it is easy to see what theory has to suggest. Let us multiply both sides of equation (11) by the value of imports from j to i, M_{ji}. Taking the geometric average of both sides, together with the symmetry of bilateral trade barriers assumption ($\tau_{ij} = \tau_{ji}$), yields:

$$\sqrt{M_{ij}M_{ji}} = \frac{Y_i Y_j}{\overline{Y}} \tau_{ij}^{1-\sigma} (P_i P_j)^{\sigma-1} \tag{12}$$

It is important to notice that theoretical gravity equation requires estimation of the average of the logs of unidirectional flows, rather than the log of the average. Therefore, a log-linearized version of equation (12) gives us the empirical counterpart of the gravity equation that we are going to use throughout:

7. Some empirical papers try to account for multilateral resistance by including a remoteness variable that is intended to reflect the average distance of country i from all trading partners other than country j. Anderson and Van Wincoop (2003) completely discard remoteness variables as they are entirely disconnected from the theory.

$$\log \sqrt{M_{ij}M_{ji}} = -\log \overline{Y} + \log Y_i Y_j + (1-\sigma)\log \tau_{ij} + (\sigma-1)\log P_i P_j \quad (13)$$

One last pending issue before we can carry out estimations is how to treat multilateral resistance terms. Multilateral resistance terms are unobservable, however, their omission might lead to biased estimates as they are a function of bilateral resistance terms (Anderson and Van Wincoop, 2003). To remedy this problem, Anderson and Van Wincoop (2003) suggest that multilateral resistance terms can be accounted for with country-specific dummies in order to get consistent estimates. Subsequently, Feenstra (2002) show that an estimation strategy with exporting and importing country fixed effects produces consistent estimates of the average border effect across countries. Hence, our estimation strategy is to replace multilateral resistance terms with country fixed effects. Finally, we have our empirical specification that is a log-linearized version of equation (12) together with importing country, exporting country and time fixed effects.[8]

Our focus in estimation is on the cultural barriers to trade, among others, for we deem such barriers as one of the most important trade barriers for the question at hand. Cultural variables reflect business norms, customs, beliefs, trust and information costs and they accrue up to bilateral barriers to trade and, in turn, might impede trade relations of countries. For expository simplicity, we disaggregate the bilateral trade barriers term and write our variable of interest -namely, civilizational/cultural heterogeneity/similarity- separately from other bilateral trade barriers. Hence, we restate our empirical specification that takes the following final form:

8. More discussion on time fixed effects follows below in Section II.B. Data.

$$(14)\ \log Imports_{ijt} = a + \theta \log Y_{it}Y_{jt} + \gamma C_{ij} + \alpha_k \tau_{kijt} + R_i + R_j + Year_t + \epsilon_{ijt}$$

where $Imports_{ijt}$ is the average (geometric) imports between countries i and j; a is a constant; $Y_{it}Y_{jt}$ is product of GDPs of the two countries assuming GDP is a proxy for expenditure on traded goods (Baldwin and Taglioni, 2007); C_{ij} is our variable of interest, that is a binary variable that captures civilizational/cultural heterogeneity/similarity across country dyads; τ_{kijt} represents all of the k control variables we account for as bilateral trade barriers other than culture; R_i is exporting country fixed effects; R_j is importing country fixed effects; $Year_t$ is yearly time fixed effects; and ϵ_{ijt} is the unaccounted-for error term.[9]

Note that a more befitting estimation strategy should also allow for, when appropriate, dyad fixed effects. Nevertheless, we cannot make use of dyad fixed effects as our variable of interest is either entirely time-invariant or has very little time variation. In order to be able to apply first-differencing or fixed-effects estimation methods we need each explanatory variable to change over time. Given that our main variable of interest is time-invariant, this methodology is not applicable. Therefore, using dyad fixed effects would wash away our variable of interest or would yield misleading estimates (Baltagi and Khanti-Akom, 1990).

III.B. Data

Measure of Trade. Measures of dyadic imports from country i to country j as well as imports from country j into country i are acquired from Correlates

9. A small difference between what theory suggests and our empirical specification is that we allow for non-unitary income elasticities.

of War Project International Trade Data Set Version 2.01.[10] Within this data set, the majority of the post-WWII data were obtained from the International Monetary Fund's Direction of Trade Statistics (2007 CD-ROM Subscription and hard copy versions for various years). These data were supplemented with data from Barbieri, Keshk and Pollins (2005), Barbieri's International Trade Dataset, Version 1.0 (Barbieri, 2002), and data from the Republic of China (ROC), Bureau of Foreign Trade.[11]

Bilateral import flows and income variables are measured in current US Dollars (millions). Usage of real income variables, instead, would require us to deflate nominal trade values as well. Unfortunately, good price indices for bilateral trade flows are often unavailable. Hence, what most authors do is to deflate the nominal trade values using some price index for the U.S. This inappropriate deflation of nominal trade values is a common mistake that biases the results (Baldwin and Taglioni, 2007). As suggested by Baldwin and Taglioni (2007), this problem can be overcome by including time dummies. Time dummies will account for some of the proper conversion factor between U.S. dollars in different years, and hence, will reduce the bias. Moreover, time-fixed effects allow the intercept to vary across periods to account for different distributions in different time periods, which takes care of time-varying trends.

Measure of Civilizations/Culture. 179 countries are classified as members of various civilizations. As described in Gokmen (2011) and in Huntington (1998), these civilizations are Western, Sinic, Islamic, Hindu, Orthodox, Latin American, African, Buddhist and "Lone" States. The classification and the construction of civilization membership is based on Huntington (1998). Ac-

10. This data set is available at http://www.correlatesofwar.org/.

11. For more details, see Barbieri et. al. (2008, 2009). This data set runs between 1870-2006, though with a considerable number of missing values for early years. This is not a source of concern for us as we use the part of the data for the period 1950 on given our income data also start from the year 1950.

cordingly, each country is assigned to a civilization.[12]

Furthermore, country dyads are formed by pairing each country with one another, which resulted in 15931 dyads. To indicate civilizational heterogeneity within a dyad we construct a variable labeled "Different Civilizations" denoting whether a pair of countries belong to different civilizations. This variable is coded as one if in a dyad the two countries i and j belong to different civilizations and as zero if both countries belong to the same civilization. Out of 15931 country-pairs, 2875 pairs are formed of countries belonging to the same civilization and 13056 pairs belonging to different civilizations.

As a second measure of civilizational/cultural cleavages/similarities we use Tanja Ellingsen's 'Ethnic Witches' Brew Data Set' that provide us with data on religious, linguistic and ethnic fragmentation within countries between 1945-2001.[13] Ellingsen (2000) collected data on the size and name of the linguistic, religious, and ethnic dominant group; the number of linguistic, religious, and ethnic groups; the size and name of the linguistic, religious, and ethnic minority group as well as ethnic affinities. She has obtained information from three reference books: Handbook of the Nations, Britannica Book of the Year and Demographic Yearbook. What is particularly important for our purpose in this data set is the information on the name and proportional size of the largest and the second largest linguistic, religious, and ethnic group. As in Gartzke and Gleditsch (2006), we have indicator variables for whether the two countries in a dyad have the same dominant religion, language and ethnicity as well as binary variables for whether a majority religion, language or ethnicity in one country is a minority group in the second country in the dyad.

12. See Gokmen (2011) for the details of country specific civilizational memberships and a more detailed discussion on Huntington's thesis of clash of civilizations. Table 1A in the appendix presents the list of countries together with the corresponding civilizations.

13. The original data by Tanja Ellingsen runs from 1945 to 1994. We use the version of the data by Gartzke and Gleditsch (2006) and this version of the data set runs up until 2001. For more details, see Ellingsen (2000) and Gartzke and Gleditsch (2006).

Other Determinants of Trade. GDP and GDP per capita values are from Penn World Tables Version 7.0.[14] Both GDP (in million dollars) and GDP per capita (in dollars) measures are in current dollars due to the justifications above.

Geographic barriers are proxies for transportation as well as information costs. Correspondingly, we have a range of geographic metrics such as contiguity variable that takes value one if there is any sort of land or water contiguity between two countries in a pair, zero otherwise.[15] Additional geographic distance metrics such as the measure of the great circle (geodesic) distance between the major cities of the countries[16], latitudinal and longitudinal distance as well as the indicators of geographic isolation and geographic barriers such as number of landlocked countries in a dyad, the land area and the internal distance of the countries are accounted for.[17] We also used the number of islands in a dyad as an additional geographic barrier.[18]

As suggested by Nunn and Puga (2011), geographical ruggedness is an economic handicap, making it expensive to transport goods. With this in mind, we improve our measure of geographic barriers by including a measure of terrain ruggedness. To our knowledge we are the first to make use of terrain ruggedness as a barrier to trade.[19] Nunn and Puga (2011) construct an index of terrain ruggedness for countries using the method originally devised by Riley, DeGloria and Elliot (1999). The ruggedness index calculation takes a point on the Earth's surface and calculates the difference in elevation between this point and

14. Available at http://pwt.econ.upenn.edu/php_site/pwt_index.php. The data are available for 189 countries and territories between 1950-2009 in current as well as constant dollars.

15. For contiguity data we use Correlates of War Project, Direct Contiguity Data, 1816-2006, Version 3.1 (Stinnett et al., 2002). See also Gochman (1991) for additional details.

16. See Head and Mayer (2002) for details.

17. These data are compiled by the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). The data are available at http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

18. Number of islands variable is created based on the data acquired from Global Island Database, available at http://gid.unep-wcmc.org/, and CIA The World Factbook, available at https://www.cia.gov/library/publications/the-world-factbook/index.html.

19. Some authors have tried to account for terrain irregularities and mountainousness by using, for instance, the number of mountain chains or average elevation (Giuliano et al., 2006).

the points in each one of the eight major directions (North, Northeast, East, Southeast, South, Southwest, West, and Northwest).[20]

To control for historical, political and institutional links we include dummy variables for whether the countries in a dyad have the same official language; whether a dyad ever had a colonial relationship, i.e. whether one was a colony of the other at some point in time; had a common colonizer after 1945, i.e. whether the two countries have been colonized by the same third country; has a current colonial link and whether the two countries have been part of the same polity.[21]

In addition to these measures, a dummy variable for whether two countries in a pair have same legal origins is also created. Same legal origin in a pair of countries might reduce information costs related to legal and regulatory systems. Moreover, sharing same legal origins might enhance trust between interacting parties (Guiso et al., 2009). Hence, we have a binary variable that takes value one if the two countries in a dyad have the same legal origins, zero otherwise [22]

We also take into account some policy related variables. As such, free trade area (FTA) and number of GATT/WTO members data are from Martin, Mayer and Thoenig (2008). As noted by Anderson and van Wincoop (2004), regional trade agreements may not be exogenous, and therefore, FTA included contemporaneously may suffer from reverse causality. A reasoning for this is that countries might have agreed on a trade agreement since they already have been trading lots for many reasons that are not observed by the econometrician. Consequently, we try lagging of FTA variable to overcome reverse causality. A four-period-lag of FTA is the best fit in terms of both significance and magni-

20. See Nunn and Puga (2011) for more details on the index of terrain ruggedness and how it is calculated.

21. These data come as well from CEPII. The data are available at http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

22. Legal origin indicators (common law, French civil law, German civil law, Scandinavian law, and Socialist law) are from La Porta et al. (1999).

tude.

Summary statistics are provided in Table 1B in the Appendix.

IV. Estimation Results

IV.A. Baseline Results

We start off by reproducing the basic specification of the gravity equation, after which we augment the basic gravity equation with our indicator variable of "Different Civilization."

Standard "gravity" model of bilateral trade explains the natural logarithm of trade with the joint income of the countries and the logs of the distance between them together with border effects (see Anderson and van Wincoop, 2003 and Rose, 2004). We include GDP per capita product of the two countries as well in our basic specification. Anderson (1979) provides a rationale of non-unitary income elasticities and the inclusion of GDP per capita by modeling the amount spent on tradable goods as a fraction of total income.

Table 1 provides the estimation output. In column (1) of Table 1 we reproduce the basic gravity equation regression with time, importing and exporting country fixed effects to establish the validity of our data set before introducing our cultural variables. The coefficients are as expected. Products of GDP and GDP per capita positively affect bilateral trade while distance decreases, contiguity increases trade. Once we have shown that our data produce basic results that are in line with the literature we augment the gravity specification with different civilizations indicator. In column (2) we look at how different civilizational membership alone impacts trade. The effect is both economically and statistically significant. If two countries in a dyad belong to different civi-

lizations their average bilateral imports drop by 118%.[23] Of course, this specification suffers from omitted variable bias, and hence, the coefficient on different civilizations dummy is an over-estimate. In columns (3) and (4) we also have the variables of the basic gravity equation as determinants of trade flows with and without country of origin and country of destination fixed effects. As expected, the magnitude of the different civilizations variable drops, nevertheless, it maintains its economic significance and remains highly significant. Being part of different civilizations reduces average bilateral imports about 34 percent.

TABLE I: Impact of Culture on Bilateral Trade: Baseline Results

	(1)	(2)	(3)	(4)
Different Civilizations		-0.781***	-0.298***	-0.274***
		(0.000)	(0.000)	(0.000)
ln Y_i*Y_j	0.286***		0.821***	0.259***
	(0.000)		(0.000)	(0.000)
ln y_i*y_j	0.815***		0.242***	0.841***
	(0.000)		(0.000)	(0.000)
ln Distance	-0.867***		-0.844***	-0.802***
	(0.000)		(0.000)	(0.000)
Contiguity	0.782***		0.729***	0.767***
	(0.000)		(0.000)	(0.000)
Year Fixed Effects	YES	YES	YES	YES
Importing Country Fixed Effects	YES	YES	NO	YES
Exporting Country Fixed Effects	YES	YES	NO	YES
Observations	206425	245423	206425	206425
R^2	0.771	0.698	0.663	0.772

Regressand: logarithm of Mean Bilateral Imports. Heteroskedasticity and serial correlation robust p-values (clustered at the dyad level) are in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

IV.B. Main Results

Once we have established the validity of our data set and the intriguing results on different civilizations indicator, we further investigate this relationship

23. Since $[exp(0.781) - 1] * 100 = 118$.

as we reach our full specification controlling for further determinants of trade flows.

In column (1) of Table 2 we extend the basic specification by accounting for a full set of geographical barriers to trade. Namely, besides distance and contiguity we enrich our geographical account with the land mass of the countries, number of landlocked countries, number of islands and the terrain ruggedness of the countries. Inclusion of additional physical barriers has no effect on the different civilizations coefficient, it is still highly negative and significant. As before GDP and GDP per capita positively affects trade, while distance reduces and contiguity increases trade. Land area is not a very well established variable in the literature (Rose and van Wincoop, 2001) and it does not produce consistently significant coefficients, which is an argument supported by Glick and Taylor (2005). Landlocked countries and island countries are consistently faced with more difficulties to trade. An innovation in our set of geographical barriers is ruggedness. As hypothesized by Nunn and Puga (2011) terrain ruggedness is a handicap that hampers trade. Not surprisingly, the coefficient on terrain ruggedness is always negative and highly significant.[24]

Column (2) of Table 2 displays the estimation results with the inclusion of some historical variables, such as common official language, ever colonial link, whether the two countries in a dyad were colonized by the same third country, current colonial link and whether the two countries were part of the same polity. These variables our commonly considered to be reflecting historical and institutional backgrounds (Blomberg and Hess, 2006; Glick and Taylor, 2005; Rose, 2004). Since they might be capturing an element of culture as well, the coefficient on different civilizations variable is now slightly reduced,

24. In an unreported regression, we also controlled for additional geographical variables such as absolute differences in latitude and longitude and the internal distances of the countries. These additional variables do not have an effect on our results, and were mostly insignificant or dropped out of the regression due to high collinearity.

TABLE II: Impact of Culture on Bilateral Trade: Main Results I

	(1)	(2)	(3)	(4)	(5)
Different Civilizations	-0.274***	-0.196***	-0.194***	-0.180***	-0.205***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln Y_i*Y_j	0.259***	0.340***	0.359***	0.449***	0.442***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln y_i*y_j	0.841***	0.769***	0.749***	0.678***	0.684***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln Distance	-0.802***	-0.690***	-0.685***	-0.666***	-0.673***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Contiguity	0.767***	0.638***	0.614***	0.569***	0.566***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln $Area_i$*$Area_j$	0.191***	0.205***	0.184***	-0.084*	-0.088*
	(0.006)	(0.002)	(0.005)	(0.089)	(0.067)
Number of Landlocked Countries	-2.076***	-1.994***	-1.965***	-1.771***	-1.789***
	(0.000)	(0.000)	(0.000)	(0.007)	(0.006)
Number of Island Countries	-2.535***	-2.112***	-2.030***	-1.178	-1.203
	(0.000)	(0.000)	(0.000)	(0.148)	(0.135)
ln $Ruggedness_i$*$Ruggedness_j$	-0.697***	-0.630***	-0.618***	-0.349***	-0.354***
	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)
Common Language		0.334***	0.159***	0.164***	
		(0.000)	(0.000)	(0.001)	
Ever Colonial Link		1.263***	1.133***	1.172***	1.243***
		(0.000)	(0.000)	(0.000)	(0.000)
Common Colonizer		0.803***	0.641***	0.627***	0.664***
		(0.000)	(0.000)	(0.000)	(0.000)
Current Colonial Link		-1.560**	-1.374**	-1.285*	-1.233*
		(0.050)	(0.048)	(0.052)	(0.061)
Ever Same Polity		0.981***	0.960***	0.962***	0.986***
		(0.000)	(0.000)	(0.000)	(0.000)
Same Legal Origin			0.438***	0.418***	0.453***
			(0.000)	(0.000)	(0.000)
FTA (t-4)				0.338***	0.332***
				(0.000)	(0.000)
Number of GATT/WTO Members				0.072***	0.072***
				(0.004)	(0.004)
Year Fixed Effects	YES	YES	YES	YES	YES
Importing Country Fixed Effects	YES	YES	YES	YES	YES
Exporting Country Fixed Effects	YES	YES	YES	YES	YES
N	206425	206425	206425	167195	167195
R^2	0.772	0.785	0.788	0.789	0.789

Regressand: logarithm of Mean Bilateral Imports. Heteroskedasticity and serial correlation robust p-values (clustered at the dyad level) are in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

though still large and statistically very significant. On average, two countries of different civilizations have 22 percent less imports than two countries of the same civilization. Common language increases bilateral trade. Past colonial links through bilateral colonial links, a common colonizer or being part of the same polity increase trade relations, whereas current colonial link has a negative effect on trade flows.

In column (3) we take into account same legal origin. As discussed by Guiso et al. (2009), sharing same legal origin might proxy for informational costs as well as norms of dealing with property rights. A quick look at Table 2 tells us that the countries that have the same legal origin significantly trade more. Their average bilateral imports are approximately 53 percent higher.

In columns (4) and (5) of Table 2 we take into account policy related variables such as free trade agreements (FTA) and GATT/WTO membership, with the difference that in column (5) we exclude common language variable to see how much this variable affects our different civilizations variables. As expected, FTAs and GATT/WTO memberships positively affect trade flows. Even in our full specification with an entire set of controls, our different civilizations indicator is statistically very significant and has a considerably large economic effect. Two countries of different civilizations trade 19 to 22 percent less than two countries of the same civilization.

To reiterate our findings further we now investigate the effect of other measures of cultural cleavages/similarity. Using *Ellingsen's Measure* of majority religions, ethnicities and languages within countries we probe the relationship between trade flows and sharing dominant religious, ethnic and linguistic heritages. To this end, we bring in new indicator variables for when the two countries in a dyad have the same majority religion or/and the same majority ethnicity or/and the same majority language.

TABLE III: Impact of Culture on Bilateral Trade: Main Results II

	(1)	(2)	(3)	(4)	(5)	(6)
Same Majority Religion	0.077				0.032	0.039
	(0.116)				(0.532)	(0.445)
Same Majority Ethnicity		0.320***			0.192**	0.181**
		(0.000)			(0.032)	(0.043)
Same Majority Language			0.462***	0.540***	0.377***	0.459***
			(0.000)	(0.000)	(0.000)	(0.000)
ln Y_i*Y_j	0.360***	0.358***	0.350***	0.348***	0.348***	0.344***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln y_i*y_j	0.764***	0.761***	0.779***	0.781***	0.790***	0.794***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln Distance	-0.611***	-0.603***	-0.590***	-0.598***	-0.579***	-0.587***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Contiguity	0.590***	0.574***	0.562***	0.555***	0.548***	0.540***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln $Area_i$*$Area_j$	-0.001	-0.020	-0.134***	-0.137***	0.098	0.094
	(0.987)	(0.715)	(0.007)	(0.006)	(0.128)	(0.146)
Number of Landlocked Countries	-1.345***	-1.035**	-2.848***	-2.857***	-2.894***	-2.910***
	(0.001)	(0.019)	(0.000)	(0.000)	(0.000)	(0.000)
Number of Island Countries	-1.554***	-3.096***	-0.805**	-0.854**	-2.158***	-2.200***
	(0.000)	(0.000)	(0.036)	(0.027)	(0.000)	(0.000)
ln $Ruggedness_i$*$Ruggedness_j$	-1.322***	-1.288***	-0.985***	-1.004***	-0.287**	-0.307**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.031)	(0.021)
Common Language	0.208***	0.191***	0.130**		0.132**	
	(0.000)	(0.000)	(0.017)		(0.018)	
Ever Colonial Link	1.119***	1.155***	1.117***	1.167***	1.129***	1.179***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Common Colonizer	0.488***	0.477***	0.396***	0.426***	0.399***	0.430***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Current Colonial Link	-1.203*	-1.215*	-1.125*	-1.070*	-1.134*	-1.078*
	(0.061)	(0.060)	(0.075)	(0.087)	(0.072)	(0.084)
Ever Same Polity	1.018***	1.082***	1.093***	1.111***	1.157***	1.176***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Same Legal Origin	0.393***	0.400***	0.342***	0.367***	0.346***	0.371***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FTA (t-4)	0.283***	0.282***	0.259***	0.255***	0.265***	0.261***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of GATT/WTO Members	0.106***	0.102***	0.107***	0.107***	0.104***	0.105***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Importing Country Fixed Effects	YES	YES	YES	YES	YES	YES
Exporting Country Fixed Effects	YES	YES	YES	YES	YES	YES
N	128672	126564	125100	125100	121746	121746
R^2	0.784	0.785	0.787	0.787	0.788	0.787

Regressand: logarithm of Mean Bilateral Imports. Heteroskedasticity and serial correlation robust p-values (clustered at the dyad level) are in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

First column of Table 3 shows that sharing the same dominant religion positively affects trade relations, though it is statistically insignificant. Columns (2) and (3) do the same exercise when the two countries share the same majority ethnicity and same majority language, respectively. When the two countries in a dyad have the same dominant ethnicity they have about 38 percent higher average imports than the two countries that do not have the same dominant ethnicity. On the other hand, two countries with the same majority language have 58 percent higher mean imports when we control for official common language and 71 percent higher mean imports when we do not control for official common language. Columns (5) and (6) look at the effects of all three variables when included together. The results carry over. Same majority religion is still positive but insignificant, while same majority ethnicity and same majority language are both strongly positive and highly significant. As before, sharing the same dominant language shows the largest magnitude.

To further investigate the impact of sharing same religious, ethnic and linguistic backgrounds we create four new indicator variables; namely, *"Majority Religion-Ethnicity-Language"* when the two countries in a dyad have the same majority religion, the same majority ethnicity as well as the same majority language; *"Majority Religion-Ethnicity"* when the two countries in a dyad have the same majority religion and also the same majority ethnicity; *"Majority Religion-Language"* when the two countries in a dyad have the same majority religion and also the same majority language; *"Majority Ethnicity-Language"* when the two countries in a dyad have the same majority ethnicity and also the same majority language.

The results of the estimations with these new explanatory variables are reported in Table 4. The results are not surprising and in support of our previous findings. As expected, sharing same dominant religion, ethnicity and language

TABLE IV: Impact of Culture on Bilateral Trade: Main Results III

	(1)	(2)	(3)	(4)
Majority Religion-Ethnicity-Language	0.241**			
	(0.049)			
Majority Religion-Ethnicity		0.168*		
		(0.057)		
Majority Religion-Language			0.193**	
			(0.018)	
Majority Ethnicity-Language				0.278**
				(0.023)
ln Y_i*Y_j	0.478***	0.477***	0.479***	0.481***
	(0.000)	(0.000)	(0.000)	(0.000)
ln y_i*y_j	0.649***	0.650***	0.648***	0.645***
	(0.000)	(0.000)	(0.000)	(0.000)
ln Distance	-0.700***	-0.698***	-0.701***	-0.699***
	(0.000)	(0.000)	(0.000)	(0.000)
Contiguity	0.573***	0.575***	0.569***	0.572***
	(0.000)	(0.000)	(0.000)	(0.000)
ln $Area_i$*$Area_j$	-0.095*	-0.094*	-0.096*	-0.095*
	(0.060)	(0.062)	(0.059)	(0.061)
Number of Landlocked Countries	-1.665**	-1.671**	-1.660**	-1.658**
	(0.011)	(0.010)	(0.011)	(0.011)
Number of Island Countries	-1.056	-1.064	-1.048	-1.039
	(0.194)	(0.190)	(0.197)	(0.201)
ln $Ruggedness_i$*$Ruggedness_j$	-0.353***	-0.353***	-0.354***	-0.354***
	(0.002)	(0.002)	(0.002)	(0.002)
Common Language	0.184***	0.190***	0.162***	0.181***
	(0.000)	(0.000)	(0.001)	(0.000)
Ever Colonial Link	1.161***	1.160***	1.156***	1.162***
	(0.000)	(0.000)	(0.000)	(0.000)
Common Colonizer	0.626***	0.624***	0.633***	0.624***
	(0.000)	(0.000)	(0.000)	(0.000)
Current Colonial Link	-1.273*	-1.278*	-1.249*	-1.270*
	(0.060)	(0.058)	(0.063)	(0.060)
Ever Same Polity	0.947***	0.952***	0.946***	0.947***
	(0.000)	(0.000)	(0.000)	(0.000)
Same Legal Origin	0.419***	0.421***	0.416***	0.419***
	(0.000)	(0.000)	(0.000)	(0.000)
FTA (t-4)	0.370***	0.372***	0.369***	0.371***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of GATT/WTO Members	0.075***	0.074***	0.078***	0.075***
	(0.002)	(0.003)	(0.002)	(0.002)
Year Fixed Effects	YES	YES	YES	YES
Importing Country Fixed Effects	YES	YES	YES	YES
Exporting Country Fixed Effects	YES	YES	YES	YES
N	167195	167195	167195	167195
R^2	0.789	0.789	0.789	0.789

Regressand: logarithm of Mean Bilateral Imports. Heteroskedasticity and serial correlation robust p-values (clustered at the dyad level) are in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

has a strong positive influence on trade. It increases mean imports by 27 percent in comparison to a pair of countries sharing none of these heritages. Sharing the same majority religion and ethnicity or the same majority religion and language has a smaller effect, although it is still sizeable (between 18 to 20 percent higher) and statistically significant. We see the biggest effect when the two countries share the same ethnicity and the same language. The average imports are 32 percent higher compared to a country pair sharing none of the these two cultural variables.

V. Is Huntington Right?

When Samuel Huntington put his "The Clash of Civilizations?" hypothesis forward and hypothesized that "the great divisions among humankind and the dominating source of conflict in the post-Cold War era will be cultural" (Huntington, 1993), he did not only have military clashes in mind but also economic and political clashes. At the micro level, the violent struggles among peoples will result as a consequence of the fault lines between civilizations, however, at the macro level, states from different civilizations will compete for economic and political power (Huntington, 1993). Huntington's "The Clash of Civilizations?" hypothesis drew a lot of attention to military conflicts between countries and some authors have tried testing it from different angles (Chiozza, 2002; Gokmen, 2011; Henderson, 1997, 1998; Henderson and Tucker, 2001; Russett et al., 2000). Nevertheless, to our knowledge, the economic clash aspect has never been put to rigorous econometric testing. Therefore, we take the challenge and test whether there has been an amplification in economic clash in the post-Cold War era as Huntington suggested.

Huntington takes civilizations as the main unit of his analyses. A civilization is defined as "a cultural entity, the highest cultural grouping of people and the

broadest level of cultural identity people have short of what distinguishes humans from other species. It is defined both by common objective elements, such as language, history, religion, customs, institutions, and by the subjective self-identification of people."[25] Huntington takes the central defining characteristic of a civilization as its religion; hence, the major civilizations in human history have been closely identified with the world's great religions. These civilizations outlined include the Sinic, Japanese, Hindu, Islamic, Orthodox, Western, Latin American, Buddhist and possibly African civilizations plus "lone" countries that do not belong to any of the major civilizations.

According to Huntington, inter-civilizational differences stand out in the way individuals comprehend the relations between God and man, the individual and the group, the citizen and the state, parents and children, husband and wife as well as in the weight of importance they put in matters of responsibility and rights, freedom and authority, and equality and hierarchy. He further claims that these differences are largely irresolvable; they are the product of centuries and are far more fundamental than differences among political ideologies and political regimes as they concern the very self-identification of man. The fact that people identify themselves with a civilization inevitably implies that they think of themselves separately from other civilizations and differentiate themselves from the members of other civilizations. To highlight this point, Huntington argues that identity at any level -personal, tribal, racial, civilizational - can only be defined in relation to an "other", a different person, tribe, race, or civilization. This brings about a group identity in the simple form of "us" and "them" which nurtures clashes with those that are different.

Huntington (1993, 1998), viewing culture as the "cause," suggests that civilizations tend to clash with other civilizations that do not share their culture,

25. Huntington (1993a), p.23-24.

world view and values. Such vehement tendencies, he argues, long held in check by the Cold War, have been unleashed by the end of the Cold War and, from then onwards, form the dominant pattern of global conflict. One theorem that logically devolves from Huntington's cultural realist rendering of clashing civilizations is that the degree of cultural dissimilarity between states should predict the likelihood of clashes between them. In this view, culturally dissimilar dyads, ceteris paribus, should be more inclined to conflict than culturally similar dyads. As such, Huntington claims that in the post-Cold War world the most important distinctions among peoples are not ideological, political, or economic, but they are cultural, and therefore, he prophesies that in the post-Cold War[26] era, compared to the Cold War era, we are to witness a surge in the clash of civilizations. By the end of the Cold War, the demise of ideology will accentuate the differences between civilizations and the clashes between civilizations will be unleashed. This is what we empirically test from an economic clash standpoint in what follows.

Before carrying out regressions, to see whether there is seemingly an economic clash of different civilization country pairs we plot mean trades calculated for different and same civilizations and their difference at each year. As such, Figure I delivers a first-pass understanding of how trade relations of countries from different and same civilizations evolved over time. We observe that from 1950s up until current day mean trade between countries of the same civilization has always been more than that of countries of different civilizations (left scale). This is not very informative as the two seem to evolve in a very similar pattern. However, if we look at the evolution of the difference between the mean trade of the same civilization countries and different civilization countries, we notice a rather different story (right scale). This difference seems to be rather

26. By most, Cold War is considered to have lasted between 1945-1991.

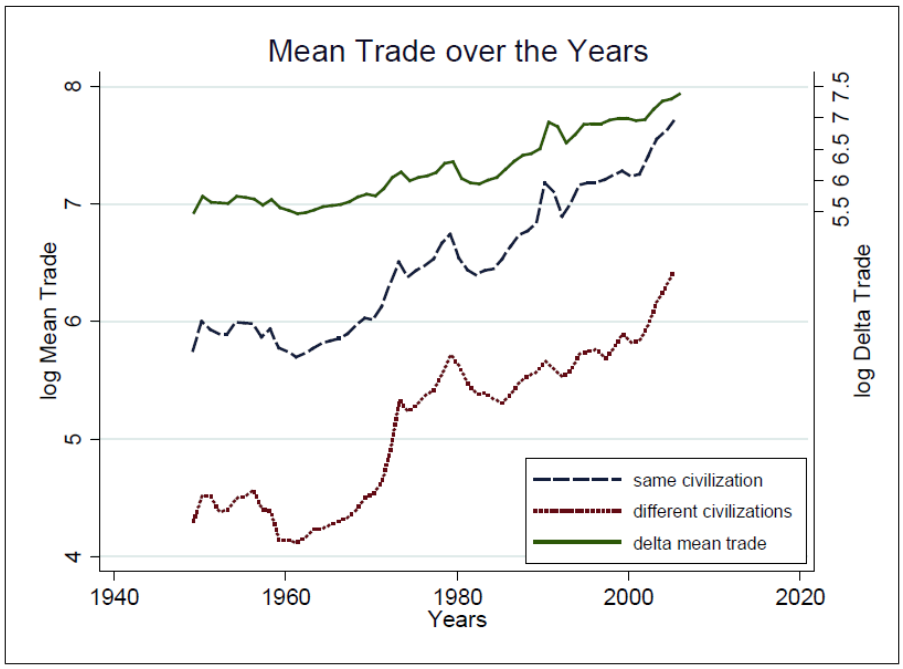

FIGURE I: EVOLUTION OF MEAN BILATERAL TRADE OVER THE YEARS FOR DIFFERENT AND SAME CIVILIZATION COUNTRY DYADS

stable from 1950 up until some point around 1985. From that point on, we see that this difference always has an upward trend and the increase in mean same civilization trade is more than the increase in mean different civilizations trade. This analysis from Figure I indicates two rather different stories, one for the Cold War period and another one for the post-Cold War period.

If we turn to Table 5, we observe a set of estimations for both Cold War and post-Cold War periods in columns (1) and (2), respectively. Each cell of a row reports the coefficient on our cultural variable of interest from a regression of mean bilateral imports with all other determinants of trade flows in the two respective time periods.

A cursory look at Table 5 would convince one that there is a surge in economic clash in the post-Cold War era as Huntington hypothesized. The effect

of belonging to two different civilizations on bilateral trade is much bigger in the post-Cold War era. Although different civilizations membership negatively impacts trade in the Cold War, it is insignificant with a very small magnitude (about 7 percent). On the other hand, in the post-Cold War era, two countries that belong to different civilizations have about 41 percent less mean imports than two countries that share the same civilization. This finding is very robust and is not subject to the definition of civilizations. In the following rows of the Table 5 we repeat the same exercise with our various measures of culture/civilization. Both economic significance and statistical significance is much stronger in the post-Cold War era than in the Cold War era. For instance, when the two trading partners share the same dominant religion, ethnicity and language, their trade is not significantly affected during the Cold War; whereas in the post-Cold War epoch they trade 76 percent more than a pair of countries that do not share these values. A country pair with the same majority religion has 6 percent higher mean imports in the post-Cold War compared to the Cold War.

These findings are very strong. In the post-Cold War period countries of different civilizational/cultural heritage have shown to display a much stronger economic clash than in the Cold War era. May the cultural heritage be being part of a civilization as Huntington classified or a more concrete definition of dominant religious, ethnic and linguistic populations, the results do not change. We observe that these results show us the end of the Cold War brought about more conflictual economic relations among countries of heterogeneous cultural backgrounds.

TABLE V: Impact of Culture on Trade: Cold War vs. post-Cold War Comparisons

	(1) Cold War	(2) post-Cold War
Different Civilizations	-0.078	-0.345***
	(0.136)	(0.000)
Same Majority Religion	0.094*	0.140**
	(0.076)	(0.031)
Same Majority Ethnicity	0.234**	0.465***
	(0.017)	(0.000)
Same Majority Language	0.302***	0.818***
	(0.004)	(0.000)
Majority Religion-Ethnicity-Language	0.172	0.568***
	(0.204)	(0.000)
Majority Religion-Ethnicity	0.145	0.374***
	(0.141)	(0.000)
Majority Religion-Language	0.216**	0.491***
	(0.038)	(0.000)
Majority Ethnicity-Language	0.271**	0.537***
	(0.045)	(0.000)

Regressand: log Mean Bilateral Imports. Regressors included but with unrecorded coefficients: ln Y_i*Y_j, ln y_i*y_j, ln Distance, Contiguity, ln $Area_i$*$Area_j$, Number of Landlocked Countries, Number of Island Countries, ln $Ruggedness_i$*$Ruggedness_j$, Common Language, Ever Colonial Link, Common Colonizer, Current Colonial Link, Ever Same Polity, Same Legal Origin, FTA (t-4), Number of GATT/WTO Members and a constant as well as time and importing and exporting country fixed effects. Heteroskedasticity and serial correlation robust p-values (clustered at the dyad level) are in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

VI. Sensitivity Analysis

In this section we challenge the sensitivity of our results. We do that, first, by including a popular measure of cultural distance -namely, genetic distance variable- and testing whether our measures of culture survive the inclusion of genetic distance. Second, we look into how the exclusion of zero trade flows might affect our results. Third, we break the panel data into five year intervals and run cross-sectional analysis.

VI.A. Our Measures of Culture vs. Genetic Distance

Genetic distance variable as a proxy for culture has recently attracted a myriad of researchers (Giuliano, Spilimbergo and Tonon, 2006; Guiso, Sapienza and Zingales, 2009; Spolaore and Wacziarg, 2009a, 2009b). To that end, we would like to test the sensitivity of our measures of culture against genetic distance variable and see how they fare in comparison.

Genetic distance is a summary measure of differences in allele frequencies across a range of neutral genes (or chromosomal loci). Correspondingly, the index constructed measures the genetic variance between populations as a fraction of the total genetic variance. Given genetic characteristics are transmitted throughout generations at a regular pace, genetic distance is closely linked to the times when two populations shared common ancestors. It is argued that the degree of genetic distance also reflects cultural distance for culture can be transmitted across genetically related individuals, and therefore, populations that are farther apart genealogically tend to be, on average, more different in characteristics that are transmitted with variations from parents to children.[27]

27. For more details and the discussion on the construction of genetic distance between populations, its corresponding mapping onto countries and its cultural implications, interested reader should see Cavalli-Sforza and Feldman (1981), Cavalli-Sforza et al. (1994), Giuliano, Spilimbergo and Tonon (2006) and Spolaore and Wacziarg (2009a).

In this strand of the literature, for instance, using genetic distance as a measure of cultural similarity/dissimilarity, researchers tried to explain the differences in the level of development across countries (Spolaore and Wacziarg, 2009a), the effect of culture on the likelihood of conflict involvement of country dyads (Spolaore and Wacziarg, 2009b) or the level of trust populations have for each other (Guiso, Sapienza and Zingales, 2009).

Given the above discussion and the importance of genetic distance in recent times we deem it necessary to establish the robustness of our results to the inclusion of this variable. The genetic distance data we use are from Spolaore and Wacziarg (2009a) as the genetic distance information on populations is mapped onto countries.

TABLE VI: Do Our Measures of Culture Survive Genetic Distance?

	(1)	(2)	(3)	(4)	(5)	(6)
Different Civilizations			-0.136***			
			(0.002)			
Same Majority Religion				0.105**		
				(0.031)		
Same Majority Ethnicity					0.241***	
					(0.010)	
Same Majority Language						0.408***
						(0.000)
Genetic Distance	-0.00024***	-0.00020***	-0.00019***	-0.00018***	-0.00017***	-0.00018***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	242608	165413	165413	128098	126001	124540
R^2	0.726	0.792	0.792	0.785	0.787	0.788

Regressand: log Mean Bilateral Imports. Regressors included but with unrecorded coefficients: column (1) includes only geographical barriers that are ln Distance, Contiguity, ln $Area_i$*$Area_j$, Number of Landlocked Countries, Number of Island Countries, ln $Ruggedness_i$*$Ruggedness_j$ and a constant as well as time and country fixed effects; the remaining columns include the full set of control variables that are ln Y_i*Y_j, ln y_i*y_j, ln Distance, Contiguity, ln $Area_i$*$Area_j$, Number of Landlocked Countries, Number of Island Countries, ln $Ruggedness_i$*$Ruggedness_j$, Common Language, Ever Colonial Link, Common Colonizer, Current Colonial Link, Ever Same Polity, Same Legal Origin, FTA (t-4), Number of GATT/WTO Members and a constant as well as time and country fixed effects. Heteroskedasticity and serial correlation robust p-values (clustered at the dyad level) are in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We present the results in Table 6. Before contrasting our measures of culture with genetic distance we, first, would like to consider whether genetic distance has any explanatory power in trade relations when we take into account basic determinants of trade barriers. Giuliano, Spilimbergo and Tonon (2006) suggest

that the effect captured by genetic distance is geographic barriers, not cultural ones. The authors show that the same geographic determinants that explain transportation costs also explain genetic distance. In addition, they provide evidence that genetic distance in a gravity equation of bilateral trade has no significance once one controls for transportation costs. Having said that, in the first column of Table 6, without including our measures of culture, we regress bilateral imports on genetic distance and geographic trade barriers only and in the second column on genetic distance and the entire set of control variables. In both cases, although genetic distance appears as statistically significant, it has near to zero economic significance. This is not to say genetic distance does not matter, however, caution is needed when using it as a cultural proxy.

Subsequently, we carry on with our tests of whether our measures of culture survive genetic distance. In column (3) of Table 6 we observe that our binary indicator of different civilizations not only maintains its negative sign and high statistical significance, but it also has a sizeable economic magnitude. When two countries in a dyad belong to different civilizations, their average trade is about 15 percent less than two countries of the same civilization.

In columns (4), (5) and (6) we carry out similar exercises for the robustness of same religious, same ethnic and same linguistic heritage variables to the inclusion of genetic distance variable. In all three cases our measures of culture do not suffer from the inclusion of genetic distance and they are significant. That is to say that even after controlling for genetic distance, countries that have the same dominant religion or the same dominant ethnicity or the same dominant language trade more with one another than country pairs that do not share the same values. For instance, if the two countries in a dyad have the same majority ethnic group, then their mean trade is around 27 percent higher on average compared to a country pair that do not share the same majority

ethnic group.

All in all, we can confidently conclude from the above analysis that our measures of culture are not sensitive to the inclusion of genetic distance as a proxy for culture. Therefore, if we believe that genetic distance captures an element of culture, our measures of culture explain some constituent of culture on top of genetic distance variable, which is not explained by genetic distance.

VI.B. Zero Trade Flows in the Gravity Model

Zero-valued trade flows between pairs of countries in gravity models might be a source of concern as argued by some authors.[28] Linders and de Groot (2006) showed that the simplest solution to this potential problem is to omit zero flows from the sample and this approach often leads to acceptable results. However, we would still like to look into whether exclusion of zero trade flows substantially change our results. We do this with the simple approach used in the literature and add one to the trade flows before taking the logarithm. Hence, our dependent variable becomes the logarithm of one plus mean imports between two countries. This procedure allows us to not drop zero trade flows and see whether our results react to the inclusion of zero trade flows.

The results using the new dependent variable defined above is in Table 7. Each column corresponds to regressions run over three different periods, Cold War, post-Cold War and the entire sample. Each row displays the coefficient corresponding to one of our measures of culture when included in a regression together with the full set of control variables.

Our previous results carry over. Being part of different civilizations has a stronger trade impeding effect in the post-Cold War era than in the Cold War era. Alternatively, sharing the same religion or the same ethnicity or the

28. For a discussion on the source of concern and the method of treatment of zero-trade flows in the gravity models, see Linders and de Groot (2006) and Silva and Tenreyro (2006).

TABLE VII: Zero Trade Flows in the Gravity Model

	(1) Cold War	(2) post-Cold War	(3) Full Sample
Different Civilizations	-0.103***	-0.359***	-0.213***
	(0.007)	(0.000)	(0.000)
Same Majority Religion	0.037	0.054	0.022
	(0.340)	(0.252)	(0.533)
Same Majority Ethnicity	0.259***	0.440***	0.325***
	(0.000)	(0.000)	(0.000)
Same Majority Language	0.210***	0.648***	0.340***
	(0.006)	(0.000)	(0.000)

Regressand: log (1+Mean Bilateral Imports). Regressors included but with unrecorded coefficients: ln Y_i*Y_j, ln y_i*y_j, ln Distance, Contiguity, ln $Area_i$*$Area_j$, Number of Landlocked Countries, Number of Island Countries, ln $Ruggedness_i$*$Ruggedness_j$, Common Language, Ever Colonial Link, Common Colonizer, Current Colonial Link, Ever Same Polity, Same Legal Origin, FTA (t-4), Number of GATT/WTO Members and a constant as well as importing and exporting country fixed effects. Heteroskedasticity and serial correlation robust p-values (clustered at the dyad level) are in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

same language has a much bigger trade promoting ramification over the post-Cold War period with respect to the Cold War period. For example, different civilizational memberships reduce the average trade between two countries by 43 percent in the post-Cold War periods while the reduction is a much lower 10 percent in the Cold War period. To give another example, while sharing the same ethnicity increases mean trade by 55 percent in the post-Cold War period, it raises it by only 29 percent in the Cold War. From this discussion and the results provided in Table 7, we can be reassured that our findings are not due to the omission of zero-trade flows and the conclusions still hold even if we include zero flows.

VI.C. Cross-Sectional Analysis

To evaluate how the role played by cultural measures in explaining bilateral trade evolved throughout time we turn, in this section, to cross-sectional analysis at five-year intervals. From 1955 on, for each five year period we estimate bilateral imports on the entire set of determinants of trade and our measures of culture.

If we look at column (1) of Table 8, we notice that binary indicator of different civilizations maintains an overall negative sign; however, it gains statistical significance only after 1985 on. Notice also the jump in magnitude from 1980 to 1985.

Let us turn to column (2). Notice how the sign of the coefficient on same majority religion indicator becomes positive from 1985 on and not only undergoes a huge jump in magnitude but also gains statistical significance in the year 1990. In column (3) and (4) we see that same majority ethnicity and same majority language indicators maintain an overall positive sign and significance. One thing is important to take note of. In column (4), although both are positive and statistically significant, the magnitude of the same majority language coeffient more than doubles from 1985 to 1990.

All this evidence is in support of our findings. We see that there is a heightened degree of economic clash at some point after 1985. However, these findings lead one to be skeptical about the general consensus about the duration of the Cold War period. Even though the Cold War is considered to have ended by 1991, the evidence suggests that the *de facto* end of the Cold War has happened earlier and some time between 1985 and 1990, which was also a conclusion of our analysis of Figure I.

TABLE VIII: Cross-Sectional Analysis

	(1)	(2)	(3)	(4)
		Same	Same	Same
	Different	Majority	Majority	Majority
	Civilizations	Religion	Ethnicity	Language
1955	0.238	-0.109	-0.475	-0.062
	(0.172)	(0.769)	(0.125)	(0.827)
1960	0.201	0.250	-0.022	-0.266
	(0.115)	(0.431)	(0.913)	(0.217)
1965	-0.010	-0.104	0.035	-0.105
	(0.914)	(0.660)	(0.860)	(0.536)
1970	-0.142	0.002	0.458***	0.460***
	(0.118)	(0.983)	(0.005)	(0.002)
1975	-0.018	-0.111	0.046	0.184
	(0.824)	(0.319)	(0.758)	(0.234)
1980	-0.075	-0.043	0.333**	0.352**
	(0.364)	(0.699)	(0.037)	(0.030)
1985	-0.240***	0.095	0.355**	0.394***
	(0.002)	(0.367)	(0.021)	(0.008)
1990	-0.335***	0.243**	0.441***	0.810***
	(0.000)	(0.013)	(0.002)	(0.000)
1995	-0.232***	0.098	0.626***	0.837***
	(0.000)	(0.260)	(0.000)	(0.000)
2000	-0.413***	0.188**	0.424***	0.751***
	(0.000)	(0.012)	(0.000)	(0.000)
2005	-0.383***			
	(0.000)			

Regressand: log Mean Bilateral Imports. Regressors included but with unrecorded coefficients: ln Y_i*Y_j, ln y_i*y_j, ln Distance, Contiguity, ln $Area_i$*$Area_j$, Number of Landlocked Countries, Number of Island Countries, ln $Ruggedness_i$*$Ruggedness_j$, Common Language, Ever Colonial Link, Common Colonizer, Current Colonial Link, Ever Same Polity, Same Legal Origin, FTA (t-4), Number of GATT/WTO Members and a constant as well as importing and exporting country fixed effects. Heteroskedasticity and serial correlation robust p-values (clustered at the dyad level) are in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

VII. Conclusion

This paper contributes to the literature on the relation between culture and bilateral trade flows of countries. First contribution of the paper is to establish the link between cultural dissimilarity/similarity and mean bilateral imports of countries. However, the main novelty of this study is to test Huntington's the *Clash of Civilizations* hypothesis from an economic perspective.

To be more specific, this paper first shows whether cultural dissimilarity between countries is, by and large, a barrier to trade. We do that by estimating a theory based gravity model of international trade and by using a comprehensive set of cultural variables that allow us to look at different aspects of culture. Based on Huntington's classification and categorization of civilizational membership of countries, we provide evidence that when two countries in a dyad are members of different civilizations their mean imports are up to 34 percent lower than that of two countries of the same civilization. We also show that when two countries in a dyad share the same ethnicity or the same language their trade relations are strongly improved upon. While two countries with the same dominant ethnicity have 38 percent higher mean imports, two countries with the same dominant language enjoy 58 percent higher mean imports.

Furthermore, we examine Huntington's "The Clash of Civilizations?" hypothesis from an economic clash point of view. We provide evidence suggesting that there is a very strong surge in economic clash (in terms of trade relations) across countries in the post-Cold War era compared to the Cold War era. For instance, two countries that belong to different civilizations have 41percent reduced mean imports in the post-Cold War period compared to two countries of the same civilization, whereas this effect is insignificant during the Cold War. Alternatively, if a pair of countries share the same majority religion, the same majority ethnicity and the same majority language, in the post-Cold War epoch

their average bilateral imports are 76 percent higher than a pair of countries that do not share the same heritages, whereas this effect is not significant in the Cold War era.

Establishing the impact of culture on trade and how this relationship evolves throughout time might only be the tip of an iceberg. One natural question to ask upon observing our results is the reason why we see such a sharp pattern of increased economic clash in the post-Cold War era. Huntington claimed that we observe such clashes because the demise of ideology in the aftermath of the Cold War unleashed cultural fault lines that were previously held in check by the ideological doctrines. Therefore, a natural future line of research would be to look into whether this claim is true and to identify the underlying reasons as for why there is a *Clash of Civilizations*.

Appendix

TABLE 1A. Civilization Membership

Civilization	Country
Western	Andorra, Australia, Austria, Barbados, Belgium, Canada, Croatia, Czech Rep., Denmark, Dominica, Estonia, Finland, France, French Guiana, Germany, Greenland, Grenada, Hungary, Iceland, Ireland, Israel, Italy, Jamaica, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Norway, Papua New Guinea, Philippines, Poland, Portugal, San Marino, Slovakia, Slovenia, Solomon Islands, Spain, Sweden, Switzerland, Trinidad and Tobago, United Kingdom, United States, Vanuatu.
Sinic	China, Hong Kong, North Korea, South Korea, Taiwan, Vietnam.
Islamic	Afghanistan, Albania, Algeria, Azerbaijan, Bahrain, Bangladesh, Bosnia and Herzegovina, Brunei, Burkina Faso, Chad, Djibouti, Egypt, Eritrea, Gambia, Guinea, Guinea-Bissau, Indonesia, Iran, Iraq, Jordan, Kyrgyzstan, Kuwait, Lebanon, Libya, Malaysia, Mali, Mauritania, Morocco, Niger, Oman, Pakistan, Qatar, Saudi Arabia, Senegal, Somalia, Sudan, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, Yemen.
Hindu	Guyana, India, Nepal.
Orthodox	Armenia, Belarus, Bulgaria, Cyprus, Georgia, Greece, Kazakhstan, Macedonia, Moldova, Romania, Russia, Serbia, Ukraine.
Latin American	Antigua and Barbuda, Argentina, Bahamas, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Rep., Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Lucia, St.Vincent & Grenadines, Uruguay, Venezuela.
African	Angola, Benin, Botswana, Burundi, Cameroon, Cape Verde, Central African Republic, Comoros, Congo, Congo Dem. Rep. (Zaire), Equatorial Guinea, Gabon, Ghana, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Sao Tome and Principe, Sierra Leone, South Africa, Suriname, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.
Buddhist	Bhutan, Cambodia, Lao People's Dem. Rep., Mongolia, Myanmar, Singapore, Sri Lanka, Thailand.
"Lone" States	Ethiopia, Haiti, Japan.

Source: Author's own construction based on Huntington (1998).

Table 1B: Summary Statistics

	Mean	Std.	N
Imports (Geometric Mean)	129.15	1860.28	476250
Different Civilizations	0.82	0.38	561356
Same Majority Religion	0.37	0.48	488473
Same Majority Ethnicity	0.032	0.17	487316
Same Majority Language	.042	.20	474560
Genetic Distance	1081.47	811.5	675391
GDP (product)	2.85e+10	4.63e+11	520445
GDP per capita (product)	43125685.12	1.35e+08	520445
Distance	7802.04	4411.10	559927
Contiguity	0.04	0.19	561356
Land Area (product)	7.84e+11	5.23e+12	555923
Number of Landlocked Countries	0.38	0.55	555923
Number of Island Countries	0.43	0.58	636729
Ruggedness (product)	1.80	2.81	621403
Common Language	0.16	0.36	559927
Ever Colonial Link	0.01	0.12	575302
Common Colonizer	0.10	0.29	575302
Current Colonial Link	0.00	0.02	559927
Ever Same Polity	0.01	0.10	559927
Same Legal Origin	0.34	0.47	604740
Free Trade Agreements (t-4)	0.03	0.16	257775
Number of GATT/WTO Members	1.41	0.64	284337
One Communist Regime Among Partners	0.14	0.35	298896

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