2-2017

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doi: 10.1111/imig.12291

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ABSTRACT

We examine the effects of immigrants and cross-societal cultural differences on bilateral trade costs using two alternative measures of cultural differences (i.e. cultural distance and genetic distance). We find that bilateral trade costs generally increase with a rise in the cultural distance between trading partners but fall with a rise in the stock of immigrants. This implies that immigrants counter bilateral trade costs that are associated with greater cultural differences. Our observation is relevant from both migration and trade policy perspectives as it provides further evidence that immigrants serve as conduits for bridging cultural differences, facilitate international transactions, and enhance global economic integration.

INTRODUCTION

International trade involves interactions across borders and between cultures, and culture influences how people think, communicate, and behave (Salacuse, 2005). Cultural differences may thus affect the nature and costs of international transactions. Both anecdotal evidence and results from empirical studies indicate that cross-societal cultural differences have a negative influence on bilateral trade flows (see, for example, Disdier et al., 2010; Tadesse and White, 2010a; White and Tadesse, 2008 and Linders et al., 2005). Given the inverse relationship between trade costs and the volume of trade, it can therefore be inferred that, all else being equal, greater cultural differences between country pairs correspond with higher trade-related transaction costs.

A growing literature documents that immigrants have the ability to serve as conduits for bridging cultural differences by providing critical information about markets, consumer preferences, and business practices that are often costly to obtain (Peri and Requena, 2009; Blanes-Cristobal, 2008; Girma and Yu, 2002).[1] These observations suggest that immigrants may have the potential to counter, either in whole or in part, increases in trade costs that stem from cross-societal cultural differences. Direct examination of this relationship, however, has been hindered by a lack of data on bilateral trade costs and, to some degree, by the absence of reliable measure of cultural differences, thus creating a void in the literature.

Using comprehensive *ad valorem* tariff equivalent estimates of bilateral trade costs and two alternative measures of cross-societal cultural differences – specifically, the cultural distance and the genetic distance between populations in immigrants' home and host countries – we attempt to fill the void in the related literature by examining whether immigrants offset the rise in trade costs associated with cultural differences and, if so, the extent to which the effect varies along the low and high ends of the cultural divergence contour. White (2010) defines cultural distance as

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International Migration
Published by John Wiley & Sons Ltd. ISSN 0020-7985

"differences in the behavior, beliefs, arts, institutions, and all other avenues by which a population, community, or a class collectively expresses its values and attitudes".[2] Genetic distance refers to " . . . the divergence in the whole set of implicit beliefs, customs, habits, biases, conventions, etc. that are transmitted across generations – biologically and/or culturally – with high persistence" (Spolaore and Wacziarg, 2009).[3] Our use of cultural distance and genetic distance as alternative measures of cultural differences makes our approach novel and our findings comprehensive, as the observed effects can be directly compared.

Our results, obtained from interchangeably using both measures of cultural differences, indicate that bilateral trade costs tend to rise as cultural differences widen and fall with increases in the immigrant stock. The observed effect of immigrants on bilateral trade costs, however, increases with a rise in cultural differences. It can therefore be inferred that the extent to which immigrants offset bilateral trade costs attributable to cultural differences is higher the more culturally divergent are the home and the host countries. Accordingly, we find that, all else being equal, a one per cent increase in cultural differences, as measured by cultural distance between the typical pair of home and host countries, is associated with a 0.1103 per cent average increase in bilateral trade costs, with the marginal trade cost-reducing effects of immigrants (in absolute terms) rising from 0.0707 per cent to 0.0735 per cent as we move from the lowest to the highest observed points on the cultural distance contour. Similarly, using genetic distance as our proxy measure of cultural differences, we find that a one per cent increase in genetic distance between the typical home and host country pairs is associated with 0.0714 per cent (on average) increase in bilateral trade costs, with the marginal trade cost-reducing effects of immigrants rising from 0.0698 per cent to 0.110 per cent as we move from the lowest to highest observed points of the genetic distance contour.

We also find that the observed influences of both immigrants and cross-societal cultural differences persist across trade costs involving manufactures and agricultural products. Given the persistence of the observed effects across product categories, our observation of relatively greater marginal trade cost-reducing effects of immigrants, specifically among home and host country pairs that are culturally more divergent, has important implications for two reasons. First, in the face of declining trade costs associated with geographic distance, as developing countries continue to face significant hurdles in integrating with in the global economy and internalizing the benefits of international trade, our observation implies that immigrants may play a significant role in enhancing the economic integration of their home countries with the rest of the world. Second, as is noted by Spolaore and Wacziarg (2013), given that inherited human characteristics transmitted from one generation to the next over the long run affect economic outcomes, our observation implies that the existing literature underestimates the significance of the economic influences attributable to immigrants.

The article proceeds as follows. Section 2 presents a review of the relevant literature. In Section 3, we discuss the empirical specifications, variables, and sources of our data. Section 4 discusses our estimation results and their policy implications. Section 5 concludes.

RELEVANT LITERATURE

While few studies examine the direct influence of cultural differences on trade costs, several works indirectly address the relationship. Boisso and Ferrantino (1997), for example, employ linguistic distance as a proxy for cultural differences and examine the corresponding effect on bilateral trade flows. While they find that greater cultural dissimilarity is negatively associated with the volume of bilateral trade flows, the authors control neither for the effects of immigrants on trade flows nor for their abilities to potentially offset the trade-inhibiting effects of cultural differences. Dunlevy (2006) uses a dummy variable representing the commonality of official languages to address the effect of cultural similarity on trade flows between the US and a number of immigrants' home countries. Using the observation of relatively higher positive influences of immigrants on US exports to home countries that use English or Spanish as an official language, Dunlevy asserts that immigrants counter the trade-inhibiting effects of cultural differences.[4]

More recent studies have examined the effects of cultural differences on trade flows by employing direct measures of cultural dissimilarity constructed using survey data and the flows of goods and services that embed and transmit culture. Cyrus (2012), for example, investigates the link between culture and bilateral trade by augmenting data from the IMF Direction of Trade Statistics with a single measure of cultural distance computed using data from the World Values Survey (WVS). Applying the gravity model to 90 countries, the author reports that culturally-distant country pairs trade less, implying that cultural distance imposes costs on trade that exceed corresponding opportunities for trade based on increased variety. Similarly, Tadesse and White (2010a) use WVS data to construct a measure of cultural distance that they describe as representative of cross-societal differences in shared norms, beliefs, traditions, and values. The authors examine the effects of cultural differences and immigrants on US state-level exports to 75 home countries and find that while state-level exports increase with a rise in the number of immigrants that reside in each state, greater cultural distance between the US and the immigrants' home countries corresponds with reduced export levels. Thus, the authors conclude that immigrants counter, at least in part, the export-inhibiting effects of cultural distance. In a related study, Tadesse and White (2010b) examine trade flows among nine OECD countries and 67 home countries and find greater cultural distance imposes economically significant and statistically-consistent negative effects on the intensive margins of trade both at aggregate and disaggregate levels. Most closely associated with the work presented here, examining the direct effects immigrants on bilateral trade costs, Tadesse and White (2015) find robust evidence indicating that immigrants reduce trade-related transaction costs.

Presenting "bilateral preferences" as a function of cultural proximity between trading partners, Disdier et al. (2009) argue that the use of trade in goods that embed and transmit culture has the advantages of larger changes over time as compared with cultural distance measures computed from a survey data. Thus, using trade in cultural goods as a proxy measure of cultural differences and examining its effects on bilateral trade flows, the authors report that cultural similarity has a positive and statistically significant influence on the volume of bilateral trade flows.

While relatively recent, using genetic distance as a proxy measure, examining the effects of culture differences on economic activity is not entirely new. Gorodnichenko and Roland (2010), for example, employ genetic distance data as an instrumental variable for the Hofstede (1980) cultural dimension of 'Individualism vs. Collectivism' and examine how individualism affects per-worker income, total factor productivity, and innovation. Guiso et al. (2009) employ genetic distance among European nations as a proxy measure of interpersonal trust. Examining its influence on bilateral trade flows, the authors find that a one standard deviation change in genetic distance corresponds with a 27 per cent reduction in the value of cross-border economic exchange.[5] Arguing that variation in migratory distance to various settlements across the globe affects genetic diversity and, thus, reflects the trade-off between the beneficial and the detrimental effects of diversity on productivity, Ashraf and Galor (2013) indicate that genetic diversity has a persistent hump-shaped effect on the economic development of African countries.

Spolaore and Wacziarg (2009 and 2013) employ genetic distance data to examine its influence on technology diffusion and economic development. Examining the influence of genetic distance on societies' positioning relative to the technological frontier, Spolaore and Wacziarg (2009) find strong evidence supporting the view that populations that are historically and culturally farther from innovators face greater hurdles to imitate and adopt new technologies due to the high costs of transactions associated with differences in values and norms, mistrust, and miscommunication. Discussing how inherited human characteristics (transmitted from one generation to the next within populations over the long run) affect economic outcomes, Spolaore and Wacziarg (2013) emphasize the importance of focusing on populations rather than locations to understand the persistence and reversal of fortunes, and the spread of economic development.

While we point to the use of genetic distance, in a broad sense, and its ability to capture differences between populations that persist over generations as a justification for our use of genetic distance to represent cross-societal cultural differences, given the unsettled nature of the extent to which genetics determines culture, we also employ cultural distance – a related but time-varying measure – to address our question of primary interest: Does the influence of immigrants, in terms of reducing trade costs, rise with cultural difference? In this endeavour, our study is the first to simultaneously and directly examine the effects of cultural differences and immigrants on bilateral trade costs. Given the contentious and political nature of issues that immigration policy presents in many countries, our findings offer information that is directly relevant for public policy. Further, as trade costs are relevant both from the perspectives of consumers and firms, by providing a better understanding of the effects of culture differences on commercial relationships, our study paves ways for the formulation of commercial policy instruments.

EMPIRICAL SPECIFICATION, DATA, AND VARIABLE CONSTRUCTION

Due to a lack of data on bilateral trade costs, using trade flows as their dependent variable series and measures of cultural differences and immigrants as control variables, previous studies have examined the potential trade-inhibiting effect of cultural differences. These studies broadly indicate that while an increase in the immigrant stock increases bilateral trade flows, greater cultural distance between the immigrants' home and host countries leads to a fall in the volume of trade flows both at the intensive and extensive margins. However, given that trade costs are not used as the dependent variable series, the results from these studies fail to corroborate the hypothesis that cultural distance increases trade costs. They also fail to substantiate the notion that immigrants offset trade costs associated with cultural differences. Thus, beyond the indirect inference that through their pro-trade effects immigrant may partially or fully counter the trade cost-increasing effects of cultural dissimilarity, the existing literature (in which trade flows were used as the dependent variable series) doesn't indicate the degree to which cultural differences increase trade costs or the extent to which immigrants counter the corresponding effects.

We overcome this shortcoming of the existing literature by using the first *ad valorem* tariff equivalent comprehensive estimates of bilateral trade costs involving 166 country pairs – of which 19 are OECD countries that host immigrants from the other OECD countries and from 147 non-OECD home countries – during the period from 1995 through 2010. The data are from Arvis et al. (2013) who derive the estimates using the inverse form of the gravity model while incorporating information on each country's bilateral export and import flows with domestic production levels.[6] Immigrant stock data are from the OECD (2015). All other variables, with the exception of the cultural distance and genetic distance measures, to be discussed below, are from the CEPII Gravity database (CEPII, 2015).

The cultural distance measure

Our measure of the cultural distance between each of the host and its trading partner home countries in our sample is computed following Tadesse and White (2010a) using data from the WVS. Conducted between 1998 and 2010, the WVS questionnaires elicit respondents' views on a wide variety of topics. Factor analysis is then employed to categorize responses (and, thus, respondents) along two dimensions of culture: Survival vs. Self-expression values (*SSE*) and Traditional vs. Secular-rational authority (*TSR*). Together, the dimensions explain more than 70 per cent of the cross-cultural variance on scores of specific values (Inglehart and Baker, 2000).

Societies that are characterized as more survival-oriented commonly emphasize hard work and self-denial and seek to achieve economic and physical security. Often, individuals in these societies hold the perception that foreigners and outsiders are threatening and view ethnic diversity and cultural change very negatively. This corresponds, for example, with an intolerance of homosexuals and minorities as well as an adherence to traditional gender roles. Such societies are often characterized by general authoritarian political outlooks. Societies that place greater emphasis on self-expression values, however, hold opposing views. The rationale is that when economic security and physical security are commonplace, cultural diversity begins to be appreciated and sought out. This cultivates tolerance towards deviations from traditional gender roles and sexual norms as well as greater support for equal rights.

On the other hand, more traditional societies tend to show greater deference to the authority of the nation, a god, or family. In fact, such deference is viewed as important or as a general expectation. In these societies, it is common for individuals to adhere to family or communal obligations, to express a high degree of national pride and/or to have a nationalistic outlook, and to show obedience to religious authority. Furthermore, large families are common, as large numbers of children are viewed as a positive or desirable achievement, and fertility rates tend to be high, while divorce, abortion, euthanasia, suicide are all viewed negatively. Societies that are more secular-rational-focused generally hold opposing views from those of individuals in traditional societies. Often, individuals in secular-rational societies adhere to rational-legal norms and emphasize economic accumulation and individual achievement.

Using the *TSR* and *SSE* values, we compute a time-varying measure of the cultural distance ($CDIST_{ijt}$) between each of the home and host countries in our study as the square root of the squared average of the sum of the differences between the respective values between the corresponding host and home country pairs: $CDIST_{ijt} = \sqrt{\left(\overline{TSR}_{jt} - \overline{TSR}_{it}\right)^2 + \left(\overline{SSE}_{jt} - \overline{SSE}_{it}\right)^2}$. Given that the data used to compute the corresponding measures have been updated from the WVS corresponding to the years, 1995-1998, 1999-2004, 2005-2008, and 2010-2012, while not necessarily annual, the resulting cultural distance measures are time-varying.[7]

The genetic distance measure

Spolaore and Wacziarg (2009) suggest that human genetic distance can be viewed as a summary measure of very long-term divergence in traits that are inter-generationally transmitted across populations. Using Nei's (1972) approach, the authors compute their measure of the genetic distance (GD_{xy}) between two populations, x and y, as $D_{ij} = -\ln(I)$, where the genetic identity (I), for any single locus with n alleles is calculated as $\frac{J_{xy}}{\sqrt{J_x J_y}}$. In the specification, $J_x = \sum_{i=1}^{n} \rho_{ix}^2$, $J_y = \sum_{i=1}^{n} \rho_{iy}^2$ and $J_{xy} = \sum_{i=1}^{n} \rho_{ix}\rho_{iy}$ are, respectively, the arithmetic means of the normalized identity of genes (i.e. a kinship coefficient) between populations x and y over all loci. The variables ρ_{ix} and ρ_{iy} represent the frequencies of the i^{th} alleles for populations x and y, respectively. Accordingly, if x and y have identical allele frequencies, I will be equal to 1, and if x and y share no alleles at all, then I will equal 0, making the measure of genetic distance between populations in two countries to range in value from 0 (for identical populations) to infinity (for entirely dissimilar populations).

According to Nei (1972), genetic variation between populations can result from genetic drift, isolation of populations, and selective pressures impacting genetic loci of populations. Thus, we argue that, reflective of a divergence in expectations and preferences of individuals and societies in different countries, greater cultural differences (i.e. genetic distance) may be associated with higher transaction costs. However, it is important to note that historically many countries have had mixed ethnicities. The growth in immigration, specifically during recent decades, also implies that several countries have become ethnically, and therefore genetically, more diverse, making the extent to which genetics determines culture vary significantly across different populations. In addition, despite the presence of a strong correlation between the genetic distance and cultural distance variables, which we use as alternative measures of cultural differences, given the persistent nature of cultural differences as represented by genetic distance and the temporal nature of the differences captured by cultural distance, the degree to which both measures reflect the effects of cultural differences on economic activity may vary.

The empirical model and control variables

To address our research question, we estimate a regression of the bilateral trade costs between the pairings of home and host countries in our sample while controlling for our variables of interest. The dependent variable series, TC_{ijt}, includes three different measures of *ad valorem* tariff equivalent trade costs: i) the costs of trade faced by exporters or importers in country i during year t that are associated with trading all products, and the disaggregated values corresponding with trading ii) manufactured goods and iii) agricultural products. Equation (1) summarizes our empirical model.

$$\ln TC_{ijt} = \alpha_0 + \beta_1 \ln CD_{ijt} + \beta_2 \ln IM_{ijt} + \beta_3 (\ln CD_{ijt} \times \ln IM_{ijt}) + \beta_x \mathbf{x}_{ijt} + \epsilon_{ijt} \qquad (1)$$

Of primary interest are the signs, relative magnitudes, and statistical significance of β_1, β_2, and β_3 – the coefficients of the variables representing the logs of cultural differences (as measured by cultural distance or genetic distance), $\ln CD_{ijt}$, the stocks of immigrants, $\ln IM_{ijt}$, and their interaction term ($\ln CD_{ijt} \times \ln IM_{ijt}$). Following the literature that examines the effects of the respective variables on the volume of bilateral trade flows, *a priori* we expect the coefficients of the cultural distance and immigrant stock variable to be positive ($\beta_1 > 0$) and negative ($\beta_2 < 0$), respectively, indicating that, all else being equal, a rise in cross-societal cultural dissimilarities corresponds with higher trading costs and that a greater immigrant stock corresponds with a fall in bilateral trade costs. The coefficient of the interaction term, however, may take positive ($\beta_3 > 0$) or negative ($\beta_3 < 0$) values depending on the relative magnitudes of the trade cost-increasing effect of cultural differences and the corresponding trade cost-reducing effect of the immigrant stock.

Our specification has an added benefit in that it enables us to quantify the marginal trade cost reduction effects of the immigrant stock at various levels of cultural differences and, hence, to identify whether the observed effect rises or falls as cultural difference increases from its lowest to highest values.[8]

The vector $\boldsymbol{X}$ includes additional explanatory variables that, theoretically, influence bilateral trade costs. Included among these control variables are measures of transportation costs, GD_{ij}, which are represented by the geodesic distance between trading partners (CEPII, 2014), and economic remoteness, REM_{it}, which is included to represent multilateral resistance. The economic remoteness variable is calculated, following Head and Ries (1998) and using World Bank (2014) data, as $REM_{it} = 1/\sum_{k=1}^{K}[(Y_{kt}/Y_{wt})/GD_{jk}]$, where Y_{wt} is gross world product, and k identifies potential non-country j trading partners for country i.[9] An analogous variable is included in our empirical specification to represent country j's economic remoteness. To account for additional geographic impediments to bilateral trade, we also include two dummy variables (LLK_i and LLK_j) that identify whether immigrants' home and host countries, respectively, are landlocked. Additionally, to control for the effects of variables that theoretically are expected to lower trade costs, we include four dummy variables that indicate whether the trading partners share a common border (CBD_{ij}), have a common language (LNG_{ij}), have (or had) a colonial relationship (COL_{ij}), or are parties to one or more multilateral trade agreement (MTA_{ij}). Data for all of the six dummy variables are obtained from the CEPII (2015). Table 1 presents summaries of the descriptive statistics for all variables.

To gain a better understanding of the determinants of the bilateral trade cost series, we start our discussion by looking at the descriptive statistics presented in Table 1. Of particular interest are the average values of bilateral trade costs, cultural distance, genetic distance, and the stocks of immigrants. The average ad valorem tariff equivalent total bilateral trade costs between the typical pair of host and home countries is 203.81 per cent, with the corresponding mean values for trade in manufactured and agricultural goods being 195.13 per cent and 264.58 per cent respectively. This indicates that, on average, trade in agricultural products is typically subject to significantly higher trade costs than manufactured goods. Varying from 0.0721 to 4.6852, the average cultural distance measure between two pairs of the trading partners in our study is estimated at 2.174. The average number of immigrants from a given home country that reside in the typical OECD host country is 44,547. Additionally, ranging from as low as 0 (no genetic differences) to 522.43 (the maximum value for the countries in our sample), the average weighted Nei genetic distance between the typical host and home countries in our sample is 135.29.

Looking at the control variables, we find that the typical host-home country pair is, on average, about 7,039 kilometers apart, with the average values for the multilateral resistance terms (i.e. the economic remoteness variables) being 5,334.04 for the typical home country and 3,556.43 for the typical host country. We also see that 19.01 per cent of the home countries in our sample are landlocked while only 10.75 per cent of the host countries lack direct access to a sea port. Further, about 2.3 per cent of the home and host country pairs in our sample share a common border, 11.58 per cent have a common official language(s), 4.62 per cent of the home and host country pairs had (or have) colonial relationships, and about 22.6 per cent of the pairs are parties to one or more mutual trade agreements that are expected to contribute to reduced bilateral trade costs.

ESTIMATION RESULTS

We estimate equation (1) using panel fixed and random effects approaches and the multilevel mixed effects random coefficients model. We report results obtained from the panel random effects generalized least squares approach.[10] To account for variability in both bilateral trade costs and the stocks of immigrants across the home-host country pairs in different regions – hence, the potential sensitivity of the results – we also employ the multilevel mixed effects random coefficient model and use the corresponding results as a robustness check. Starting with the bare-bone version of our model and sequentially adding our variables of interest and their interaction term, we estimate several iterations of equation (1). First, with the notion that while cultures may gradually change over time (particularly given the increasing integration of world economies), we address our question by using the time-varying composite measure of cultural differences, calculated from the various waves of the WVS data (Inglehart et al., 2004).[11] Then, we address our question by replacing the time-varying cultural distance measure with our measure of genetic distance. Table 2 and Table 3 present results obtained when using the respective measures of cultural differences. Column (a) of both tables presents results obtained when estimating the bare-bone version of our regression model. Corresponding results obtained when considering variation in the influences of our measures of cultural differences and the stocks of immigrants, with and without the interaction term between each of the cultural difference measures and the immigrant stock variable, are presented in columns (b) through (d).

Do immigrants offset the influence of cultural differences on bilateral trade costs?

Looking across the specifications at the coefficients of the cultural distance variable, we find that, regardless of the measure of trade costs evaluated and the specification used, the variable retains a consistently positive and statistically significant coefficient, although with some variation in

TABLE 1

PANEL DESCRIPTIVE STATISTICS OF THE VARIABLES IN THE MODEL

Variables		Mean	Std. Dev.	Min	Max	Observations
Total Trade Costs	overall	203.8129	122.8174	0.1865	1,078.267	N = 16,146
	between		123.2416	15.9975	1,020.64	n = 2,168
	within		36.67618	−108.5421	666.1232	T-bar = 7.4474
Manufacturing Trade Costs	overall	195.1329	118.2473	0.7144	980.5485	N = 15,521
	between		118.6002	13.4921	760.3045	n = 2,112
	within		36.8409	−102.3896	635.7199	T-bar = 7.349
Agricultural Trade Costs	overall	264.5806	144.8674	25.0272	1,320.59	N = 11,557
	between		151.1511	38.1101	1,194.7	n = 1,625
	within		46.896	−114.974	768.8652	T-bar = 7.112
ln Immigrants $_{ijt}$	overall	44.5478	331.3275	0	11746.54	N = 16,146
	between		230.5921	0	9581.502	n = 2,168
	within		62.2311	2642.167	2209.585	T-bar = 7.4474
ln Cultural Distance (Index)$_{ijt}$	overall	2.1741	0.9717	0.0721	4.6852	N = 9,318
	between		0.9433	0.08	4.6852	n = 1,186
	within		0.1354	1.2732	3.2906	T-bar = 7.8567
ln Genetic Distance$_{ij}$	overall	135.2926	108.1081	0	522.4349	N = 16,146
	between		117.3851	0	522.4349	n = 2,168
	within		0	135.2926	135.2926	T-bar = 7.4474
Common National Borders$_{ij}$	overall	0.0237	0.1522	0	1	N = 16,146
	between		0.141	0	1	n = 2,168
	within		0	0.0237	0.0237	T-bar = 7.4474
Common Official Language$_{ij}$	overall	0.1158	0.32	0	1	N = 16,146
	between		0.3492	0	1	n = 2,168
	within		0	0.1158	0.1158	T-bar = 7.4474
ln Economic Remoteness (Home)$_{it}$	overall	5,334.04	2,473.948	1,183.669	11,728.15	N = 16,146
	between		2,458.217	1,201.202	11,728.15	n = 2,168
	within		84.1136	4,714.696	5,775.7	T-bar = 7.4474
ln Economic Remoteness (Host)$_{jt}$	overall	3,556.434	2,796.09	1,183.669	10,905.2	N = 16,146
	between		2,336.228	1,201.637	10,902.8	n = 2,168
	within		56.2037	3,298.692	3,705.354	T-bar = 7.4474
ln Geodesic Distance$_{ij}$	overall	7,039.327	4,421.225	160.9283	19,516.56	N = 16,146
	between		4,243.991	160.9283	19,516.56	n = 2,168
	within		0	7,039.327	7,039.327	T-bar = 7.4474

TABLE 1

(CONTINUED)

Variables		Mean	Std. Dev.	Min	Max	Observations
Landlocked (Home)	overall	0.1918	0.3937	0	1	N = 16,146
	between		0.4013	0	1	n = 2,168
	within		0	0.1918	0.1918	T-bar = 7.4474
Landlocked (Host)	overall	0.1076	0.3099	0	1	N = 16,146
	between		0.388	0	1	n = 2,168
	within		0	0.1076	0.1076	T-bar = 7.4474
Mutual Trade $Agreement_{ijt}$	overall	0.2261	0.4183	0	1	N = 16,146
	between		0.387	0	1	n = 2,168
	within		0.1717	0.7114	1.1636	T-bar = 7.4474
Past Colonial $Relationship_{ij}$	overall	0.0462	0.2099	0	1	N = 16,146
	between		0.2138	0	1	n = 2,168
	within		0	0.0462	0.0462	T-bar = 7.4474

TABLE 2

TRADE COSTS, CULTURAL DISTANCE AND IMMIGRANTS: RESULTS FROM PANEL RANDOM EFFECTS ESTIMATION

	Total Trade Costs				Manufactures Trade Costs				Agricultural Products Trade Costs			
Variables	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
$Landlocked_i$ (Home)	0.314***	0.329***	0.210***	0.210***	0.296***	0.307***	0.186***	0.186***	0.306***	0.306***	0.218***	0.220***
	(0.0230)	(0.0327)	(0.0280)	(0.0280)	(0.0242)	(0.0346)	(0.0296)	(0.0296)	(0.0283)	(0.0400)	(0.0341)	(0.0341)
$Landlocked_j$ (Host)	0.224***	0.210***	0.179***	0.179***	0.215***	0.213***	0.175***	0.175***	0.376***	0.346***	0.313***	0.317***
	(0.0261)	(0.0342)	(0.0291)	(0.0291)	(0.0275)	(0.0358)	(0.0304)	(0.0304)	(0.0310)	(0.0397)	(0.0338)	(0.0339)
ln Geodesic $Distance_{ij}$	0.209***	0.208***	0.162***	0.162***	0.229***	0.227***	0.181***	0.181***	0.225***	0.256***	0.214***	0.214***
	(0.0160)	(0.0179)	(0.0153)	(0.0153)	(0.0167)	(0.0188)	(0.0160)	(0.0160)	(0.0167)	(0.0195)	(0.0168)	(0.0168)
ln Economic $Remoteness_{it}$	0.240***	0.0300	0.0782***	0.0779***	0.218***	0.00610	0.0566**	0.0556**	0.0199	0.136***	0.0772***	0.0840***
	(0.0226)	(0.0264)	(0.0228)	(0.0229)	(0.0238)	(0.0278)	(0.0239)	(0.0240)	(0.0240)	(0.0291)	(0.0252)	(0.0252)
ln Economic $Remoteness_{jt}$	0.0170	−0.0902***	0.0769***	0.0770***	0.00248	−0.0938***	0.0810***	0.0811***	−0.0804***	−0.209***	−0.0160	−0.0155
	(0.0204)	(0.0268)	(0.0232)	(0.0232)	(0.0215)	(0.0283)	(0.0244)	(0.0244)	(0.0223)	(0.0298)	(0.0261)	(0.0261)
Common National $Borders_{ij}$	−0.636***	−0.537***	−0.433***	−0.435***	−0.602***	−0.488***	−0.368***	−0.372***	−0.644***	−0.533***	−0.386***	−0.410***
	(0.0708)	(0.0700)	(0.0591)	(0.0595)	(0.0733)	(0.0730)	(0.0617)	(0.0621)	(0.0695)	(0.0740)	(0.0630)	(0.0633)
Common Official $Language_{ij}$	−0.0422**	−0.0330*	0.0419*	0.0418*	−0.0275**	−0.0287**	0.0540**	0.0538**	−0.0878***	−0.109**	−0.0182*	−0.0182***
	(0.0200)	(0.0219)	(0.0256)	(0.0256)	(0.0117)	(0.0139)	(0.0173)	(0.0373)	(0.0329)	(0.0464)	(0.0095)	(0.00596)
Past Colonial $Relationship_{ij}$	−0.364***	−0.233***	−0.0675	−0.0677	−0.381***	−0.235***	−0.0554	−0.0560	−0.238***	−0.233***	−0.0393	−0.0426
	(0.0474)	(0.0581)	(0.0493)	(0.0493)	(0.0495)	(0.0606)	(0.0514)	(0.0214)	(0.0472)	(0.0614)	(0.0524)	(0.0524)
Mutual Trade $Agreement_{ijt}$	−0.135***	−0.163***	−0.129***	−0.129***	−0.148***	−0.179***	−0.141***	−0.141***	−0.130***	−0.139***	−0.0988***	−0.0981***
	(0.00679)	(0.00719)	(0.00724)	(0.00724)	(0.00754)	(0.00800)	(0.00804)	(0.00804)	(0.00732)	(0.00784)	(0.00781)	(0.00781)
ln Cultural Distance $(Index)_{ijt}$		0.152***	0.147***	0.142***		0.172***	0.163***	0.168***		0.0789***	0.0803***	0.119***
		(0.0114)	(0.0108)	(0.0143)		(0.0125)	(0.0118)	(0.0155)		(0.0121)	(0.0114)	(0.0157)
ln $Immigrants_{ijt}$			−0.0730***	−0.0725***			−0.0806***	−0.0790***			−0.0968***	−0.0870***
			(0.00305)	(0.00421)			(0.00335)	(0.00460)			(0.00368)	(0.00459)
ln Cultural $Distance_{ij}$ × ln $Immigrants_{ijt}$				−0.000712**				−0.00225**				0.0156***
				(0.000400)				(0.00179)				(0.00439)
Constant	1.190***	3.554***	2.334***	2.335***	1.285***	3.583***	2.294***	2.298***	4.398***	5.999***	4.503***	4.528***
	(0.216)	(0.267)	(0.231)	(0.231)	(0.228)	(0.282)	(0.243)	(0.244)	(0.235)	(0.297)	(0.259)	(0.259)
Wald Chi-Square	2,261	1,686	2,732	2,733	2,124	1,639	2,667	2,669	1,344	1,096	2,064	2,077
σ^2_u	0.408	0.370	0.311	0.311	0.419	0.382	0.321	0.321	0.396	0.392	0.333	0.333
σ^2_e	0.147	0.128	0.128	0.128	0.160	0.142	0.142	0.142	0.141	0.134	0.132	0.132
rho	0.885	0.892	0.855	0.855	0.873	0.878	0.837	0.837	0.888	0.896	0.864	0.864
No. of Observations	16,146	9,318	9,294	9,294	15,521	9,156	9,134	9,134	11,557	7,984	7,972	7,972

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

magnitude. For simplicity, using the results presented in column (b) of the respective dependent variable series, for instance, given the double-log nature of the variables that enter our specification, we can say that, all else being equal, a one per cent increase in the cultural distance between the typical host and home countries in our sample corresponds with a 0.152 per cent increase in bilateral trade costs for all products, 0.172 per cent for manufactured goods, and 0.079 per cent for agricultural products. On the other hand, looking at the coefficients of the immigrant stock variable presented in column (c), we find an assumed one per cent increase in the stocks of immigrants, all else being equal, is associated with a 0.730 per cent decrease in aggregate bilateral trade costs, a 0.806 per cent decrease in trade costs involving manufactures, and a 0.097 per cent decrease in trade costs involving agricultural products.

Comparing the magnitudes of the coefficients of both the cultural distance and the immigrants stocks across the various specifications, we see that the corresponding effects of both variables remain consistent in terms of the sign of the respective coefficients (positive for the cultural distance variable and negative for the immigrant stock variable); however, the magnitude of the coefficients change, indicating the sensitivity of their influences to the absolute magnitude of the other variable. Thus, in column (d), we present results obtained from our fully specified model in which both variables and their interaction term are included. The results indicate that the coefficients of both variables retain their respective signs and the statistical significance that is observed from the specifications in which the interaction term was not included. The coefficients of the interaction term are also significantly different from zero.[12]

The sign of the coefficient of the interaction term, however, differs across the sectors considered. While it is negative for aggregate trade costs and manufactures, it is positive for agricultural products. Accordingly, taking the signs and the coefficients of the interaction term into account, we estimate the average effect of a one per cent increase in cultural distance on the bilateral trade costs, at the mean of the stocks of immigrants from the typical home in the typical host, in our study as 0.110 per cent for aggregate trade costs, 0.068 per cent for trade costs involving manufactures, and 0.814 per cent for agricultural products. For immigrant stocks, the corresponding effects are estimated at −0.074 per cent at the aggregate level, −0.0838 per cent for manufactures, and 0.053 per cent for agricultural products.[13]

Turning to the coefficients of the control variables in Table 2, we observe that greater geodesic distance correlates with higher bilateral trade costs both at the aggregate level (column (a)) and across the sectors considered: manufactures (column (f)) and agricultural products (column (k)). Likewise, compared with home or host countries that have access to the sea, bilateral trade costs are higher among country pairs where one (or both) is landlocked. Increased levels of home country economic remoteness (i.e. multilateral resistance) are associated with higher trade costs. For host countries, however, the observed effect of increased multilateral resistance is not consistently positive in that, in a few instances, we observe higher values of economic remoteness corresponding with a fall in bilateral trade costs. Consistent with theoretical expectations, we also find that country pairs which share a common official language(s), a common border, or are parties to a bilateral or multilateral trading agreement(s) have lower bilateral trade costs than country pairs which do not share these attributes. The coefficient estimates of the dummy variable that indicates past colonial relationships are also consistently negative and statistically significant, indicating that, relative to country pairs that do(did) not have the relationships, bilateral trade costs are lower among those that have (or had) such a relationship.

Finally, given the recent emphasis placed on using cultural differences to explore the differences in economic outcomes and its persistence across countries, Spolaore and Wacziarg (2013) stress the need to focus on populations rather than locations. Taking their point into account, we estimate our specification by replacing the composite measure of cultural distance with the genetic distance variable. Table 3 presents the corresponding results.

Consistent with our observations from using cultural distance as a proxy measure of cultural differences, results in the table indicate that both at aggregate and sector levels a rise in cultural differences as measured by genetic distance among the populations in the home and host countries is associated with a rise in bilateral trade costs, and increases in the immigrant stock from a given home residing in a given host is associated with a fall in bilateral trade costs. In addition to almost all of the control variables maintaining the previously observed effects, using results from the fully-specified model (column (d)), we find that, all else being constant, the elasticity of bilateral trade costs with respect to genetic distance (computed at the mean of the immigrant stock variable) 0.071 per cent, 0.0667 per cent and 1.176 at the aggregate level, manufactures and agricultural products, respectively. Likewise, the corresponding elasticity bilateral trade costs with respect to the immigrant stocks (at the mean of the genetic distance) are found to be −0.146 per cent, −0.149 per cent, and −0.010 per cent, respectively.[14]

Do immigrants reduce bilateral trade costs at all levels of cultural differences?

Consistent with our expectation and the literature, our results indicate that cross-societal cultural differences, measured by both cultural distance (i.e. a temporal measure) and by genetic distance (i.e. a persistent measure), on average, are associated with a rise in trade-related transaction costs. We also find that immigrants reduce bilateral trade costs between their home and host countries. The ability of immigrants to reduce bilateral trade costs, however, can be split into two: (i) their capacity to bridge cultural differences (e.g. languages and knowledge of home country business practices), and (ii) provision of information necessary for matching exporters and importers, networks suitable for the initiation and completion of trade deals, and contract enforcement (especially when informal contracting is commonplace). The relatively consistent trade costs reduction effects of immigrants observed from both measures should not be surprising.

Nonetheless, the composition of immigrants from a given home country that reside in a given host country and the cross-societal cultural differences that increase transaction costs may vary substantially across countries, especially when considering the differences in the push and pull factors associated with migration, and the values, beliefs and opinions of people in various enclaves. As a result, when comparing the extent to which immigrants reduce the trade costs associated with cultural differences between their home and host countries, considerable variation in the effects should be expected at various thresholds of the cultural difference "contour".[15] Thus, we ask: Do immigrants reduce bilateral trade costs at all levels of cultural differences? Given that our estimation equation (1) includes an interaction term between our measures of cultural distance and the immigrant stock variable, we examine the pattern of the observed effects by estimating the marginal effects of immigrants on bilateral trade costs at various levels (contours) of both of our cultural difference measures. Table 4 presents the corresponding effects for the aggregate (i.e. overall or total) and sector-specific bilateral trade costs using the fully-specified version of our model for each of the dependent variable series.

Results presented in Table 4 indicate that, both at the aggregate level and across the sectors considered, the marginal bilateral trade costs reduction effects of immigrants remain consistently significant at various thresholds of our cultural difference measures. Further, while relatively lower when using our genetic distance measure, the magnitudes (in absolute terms) of the observed effects rise with a rise in the level of cultural differences as measured by the respective variables. Accordingly, all else being constant, the marginal trade cost-reducing effects of a one per cent increase in the stock of immigrants rises from 0.0707 per cent to 0.735 per cent as the natural logs of our time varying measure of cultural difference (cultural distance) rises from its lowest value (−2.62) to its highest value (1.38). Likewise, the corresponding effect on trade costs involving manufactures rises

TABLE 3

TRADE COSTS, GENETIC DISTANCE AND IMMIGRANTS: RESULTS FROM PANEL RANDOM EFFECTS ESTIMATION

	Total Trade Costs				Manufactures Trade Costs				Agricultural Products Trade Costs			
Variables	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
$Landlocked_i$ (Home)	0.299***	0.297***	0.182***	0.182***	0.281***	0.280***	0.162***	0.162***	0.326***	0.320***	0.241***	0.239***
	(0.0079)	(0.0079)	(0.0072)	(0.0072)	(0.0083)	(0.0084)	(0.0076)	(0.0076)	(0.0098)	(0.0099)	(0.0094)	(0.0094)
$Landlocked_j$ (Host)	0.280**	0.241*	0.166**	0.168**	0.240*	0.200	0.143	0.143	0.342***	0.338***	0.274***	0.269***
	(0.121)	(0.125)	(0.0818)	(0.0847)	(0.130)	(0.135)	(0.0889)	(0.0921)	(0.120)	(0.117)	(0.0969)	(0.100)
ln Geodesic $Distance_{ij}$	0.135***	0.113***	0.0872***	0.0853***	0.160***	0.140***	0.115***	0.113***	0.197***	0.180***	0.163***	0.165***
	(0.0062)	(0.0063)	(0.0055)	(0.0055)	(0.0064)	(0.0065)	(0.0057)	(0.0057)	(0.0063)	(0.0064)	(0.0059)	(0.0059)
ln Economic $Remoteness_{it}$	0.324***	0.238***	0.193***	0.194***	0.302***	0.225***	0.182***	0.183***	0.0990***	0.0327***	0.0167**	0.0134
	(0.0081)	(0.0088)	(0.0077)	(0.0077)	(0.0083)	(0.0091)	(0.0081)	(0.0081)	(0.0084)	(0.0091)	(0.0084)	(0.0084)
ln Economic $Remoteness_{jt}$	0.0217	−0.0463	0.198***	0.196***	−0.0695	−0.143	0.142**	0.136**	−0.175**	−0.191**	−0.0245	−0.0301
	(0.0802)	(0.0823)	(0.0571)	(0.0588)	(0.0857)	(0.0884)	(0.0617)	(0.0636)	(0.0805)	(0.0787)	(0.0662)	(0.0680)
Common National $Borders_{ij}$	−0.606***	−0.592***	−0.434***	−0.464***	−0.569***	−0.557***	−0.390***	−0.421***	−0.526***	−0.524***	−0.377***	−0.352***
	(0.0224)	(0.0225)	(0.0198)	(0.0207)	(0.0232)	(0.0234)	(0.0208)	(0.0217)	(0.0213)	(0.0215)	(0.0201)	(0.0210)
Common Official $Language_{ij}$	−0.0957***	−0.114***	−0.0826***	−0.0808***	−0.0982***	−0.114***	−0.0817***	−0.0797***	−0.0623***	−0.0771***	−0.0647***	−0.0665***
	(0.0121)	(0.0120)	(0.0106)	(0.0106)	(0.0126)	(0.0126)	(0.0112)	(0.0112)	(0.0124)	(0.0124)	(0.0115)	(0.0115)
Past Colonial $Relationship_{ij}$	−0.242***	−0.248***	−0.0326**	−0.0286*	−0.230***	−0.236***	−0.0215	−0.0174	−0.211***	−0.222***	−0.0609***	−0.0677***
	(0.0176)	(0.0175)	(0.0156)	(0.0156)	(0.0183)	(0.0182)	(0.0164)	(0.0164)	(0.0168)	(0.0168)	(0.0159)	(0.0160)
Mutual Trade $Agreement_{ijt}$	−0.271***	−0.243***	−0.192***	−0.193***	−0.274***	−0.249***	−0.195***	−0.196***	−0.228***	−0.204***	−0.175***	−0.177***
	(0.0099)	(0.0100)	(0.0088)	(0.0088)	(0.0103)	(0.0104)	(0.0092)	(0.0092)	(0.0103)	(0.0104)	(0.0096)	(0.0096)
ln Genetic $Distance_{ij}$		0.0920***	0.0970***	0.0932***		0.0846***	0.0824***	0.0890***		0.984***	0.986***	0.9400***
		(0.0035)	(0.0031)	(0.0033)		(0.0036)	(0.0032)	(0.0034)		(0.0035)	(0.0032)	(0.0038)
ln $Immigrants_{ijt}$			−0.103***	−0.0797***			−0.104***	−0.0812***			−0.0869***	−0.728***
			(0.00145	(0.0048)			(0.0016)	(0.0051)			(0.0019)	(0.0057)
ln Genetic $Distance_{ij}$ × ln $Immigrants_{ijt}$				−0.00049***				−0.0005***				0.00531***
				(0.0001)				(0.0001)				(0.0012)
Constant	1.038	2.182***	1.075**	1.068**	1.695**	2.812***	1.366***	1.385***	4.368***	4.952***	4.107***	4.199***
	(0.632)	(0.650)	(0.452)	(0.465)	(0.676)	(0.698)	(0.488)	(0.503)	(0.635)	(0.622)	(0.524)	(0.538)

TABLE 3

(CONTINUED)

Variables	Total Trade Costs				Manufactures Trade Costs				Agricultural Products Trade Costs			
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
Wald Chi-Square	15,850	16,084	25,719	25,776	14,959	14,981	23,586	23,638	9,413	9,611	13,106	13,142
σ^2_u	0.180	0.186	0.120	0.125	0.194	0.202	0.131	0.136	0.176	0.171	0.140	0.145
σ^2_e	0.396	0.391	0.342	0.342	0.405	0.400	0.353	0.353	0.375	0.371	0.343	0.343
rho	0.170	0.185	0.110	0.118	0.186	0.203	0.121	0.129	0.181	0.176	0.143	0.152
Observations	16,475	16,153	16,056	16,056	15,838	15,528	15,440	15,440	11,989	11,723	11,672	11,672

See Table 2 notes.

TABLE 4

MARGINAL EFFECTS OF IMMIGRANT STOCKS ON TRADE COSTS AT VARIOUS LEVELS OF CULTURAL DISTANCE AND GENETIC DISTANCE, RESULTS BASED ON PANEL RE SPECIFICATION

Levels of Mediating Variable: *ln (Cultural Distance)*	Total Trade Costs	Manu. Trade Costs	Agri. Trade Costs	Levels of Mediating Variable: *ln (Genetic Distance)*	Total Trade Costs	Manu. Trade Costs	Agri. Trade Costs
−2.62	−0.0707***	−0.0731***	−0.141***	−1.99	−0.0698***	−0.0712***	−0.120***
	(0.0137)	(0.015)	(0.0075)		(0.0068)	(0.0071)	(0.0082)
−2.37	−0.0708***	−0.0736***	−0.135***	−1.49	−0.0723***	−0.0737***	−0.117***
	(0.0128)	(0.014)	(0.0068)		(0.0063)	(0.0066)	(0.0076)
−2.12	−0.0710***	−0.0742***	−0.129***	−0.99	−0.0748***	−0.0762***	−0.115***
	(0.0118)	(0.0129)	(0.0061)		(0.0058)	(0.0061)	(0.007)
−1.87	−0.0712***	−0.0748***	−0.122***	−0.49	−0.0773***	−0.0787***	−0.112***
	(0.0108)	(0.0118)	(0.0054)		(0.0054)	(0.0056)	(0.0064)
−1.62	−0.0714***	−0.0753***	−0.116***	0.01	−0.0797***	−0.0812***	−0.109***
	(0.0099)	(0.0108)	(0.0048)		(0.0049)	(0.0051)	(0.0058)
−1.37	−0.0715***	−0.0759***	−0.110***	0.51	−0.0822***	−0.0837***	−0.107***
	(0.0089)	(0.0098)	(0.0042)		(0.0044)	(0.0046)	(0.0052)
−1.12	−0.0717***	−0.0765***	−0.103***	1.01	−0.0847***	−0.0862***	−0.104***
	(0.008)	(0.0087)	(0.0037)		(0.004)	(0.0041)	(0.0046)
−0.87	−0.0719***	−0.0770***	−0.0972***	1.51	−0.0872***	−0.0887***	−0.102***
	(0.0071)	(0.0077)	(0.0033)		(0.0035)	(0.0036)	(0.0041)
−0.62	−0.0721***	−0.0776***	−0.0909***	2.01	−0.0897***	−0.0913***	−0.0989***
	(0.0062)	(0.0068)	(0.003)		(0.0031)	(0.0032)	(0.0035)
−0.37	−0.0723***	−0.0781***	−0.0846***	2.51	−0.0921***	−0.0938***	−0.0962***
	(0.0053)	(0.0058)	(0.003)		(0.0026)	(0.0027)	(0.003)
−0.12	−0.0724***	−0.0787***	−0.0783***	3.01	−0.0946***	−0.0963***	−0.0936***
	(0.0046)	(0.005)	(0.0032)		(0.0022)	(0.0023)	(0.0026)
0.13	−0.0726***	−0.0793***	−0.0720***	3.51	−0.0971***	−0.0988***	−0.0910***
	(0.0039)	(0.0042)	(0.0035)		(0.0019)	(0.002)	(0.0022)
0.38	−0.0728***	−0.0798***	−0.0657***	4.01	−0.0996***	−0.101***	−0.0883***
	(0.0033)	(0.0037)	(0.004)		(0.0016)	(0.0017)	(0.002)
0.63	−0.0730***	−0.0804***	−0.0595***	4.51	−0.102***	−0.104***	−0.0857***
	(0.0031)	(0.0034)	(0.0046)		(0.0015)	(0.0016)	(0.002)

TABLE 4

(CONTINUED)

Levels of Mediating Variable: *ln (Cultural Distance)*	Total Trade Costs	Manu. Trade Costs	Agri. Trade Costs	Levels of Mediating Variable: *ln (Genetic Distance)*	Total Trade Costs	Manu. Trade Costs	Agri. Trade Costs
0.88	−0.0731***	−0.0809***	−0.0532***	5.01	−0.105***	−0.106***	−0.0830***
	(0.0031)	(0.0034)	(0.0052)		(0.0015)	(0.0016)	(0.0022)
1.13	−0.0733***	−0.0815***	−0.0469***	5.51	−0.107***	−0.109***	−0.0804***
	(0.0035)	(0.0038)	(0.0059)		(0.0017)	(0.0018)	(0.0025)
1.38	−0.0735***	−0.0821***	−0.0406***	6.01	−0.110***	−0.111***	−0.0778***
	(0.004)	(0.0044)	(0.0066)		(0.002)	(0.0021)	(0.003)
No. of Observations	9,294	9,134	7,972	No. of Observations	16,056	15,440	11,513

See Table 2 notes.

from rises from 0.073 per cent to 0.082 per cent; however, for agricultural products, the effect diminishes from 0.141 per cent to 0.0406 per cent. When using genetic distance as well, with the exception of agricultural products, where we find the observed effects falling as genetic distance rises, both for the total trade and manufactures we find the bilateral trade cost-reduction effects of immigrants lower at the lower end of the cultural difference contour and higher at the upper end of the contour.

Two important inferences can be gleaned from these results. First, the observation that higher bilateral trade costs generally correlate with greater cultural differences indicates that at higher levels of cultural distance the proportion of total trade costs due to cultural differences is dominant. Given their unique ability to bridge cultural differences, immigrants are able to reduce such costs. Second, the corresponding effect of immigrants on trade costs involving agricultural products is lower. Perhaps due to relative bulkiness, agricultural goods generally face higher transportation costs. Agricultural products typically subject to relatively significant impediments (e.g. due to tariffs and quotas, etc.), making the proportion of total trade costs attributable to factors other than cultural differences higher. Also, while manufactures are often differentiated, agricultural products are homogenous. Consequently, while the ability of immigrants to reduce the bilateral trade costs involving agricultural products may persist, the observed effect may remain lower at higher levels of cultural differences than at lower levels.

Robustness checks

To evaluate the robustness of our results, we compare our results with estimation results obtained from an alternative estimation approach, the multilevel mixed effects model, which allows us to account for variations in the bilateral trade costs structure of the trading partners. It should be noted that our dependent variable series, the bilateral trade costs, and our measures of cultural differences, are multi-dimensional, varying substantially both across broad geographic regions, countries (populations) within a region, and over time. While the random effects panel data model we estimate so far accounts for the variation in trading costs across trading partners and the time dimension of our data, it does not specifically account for the variances in the structure of trade costs arising from regional clustering of the trading partners (i.e. differences in trade-orientation of the partners in various geographic regions). Thus, we follow the Rabe-Hesketh and Skrondal (2008) framework and estimate our specification using a multilevel mixed effects model (i.e. random intercepts for regions and countries pairs within each region, and random coefficients for the stocks of immigrants from each home country in each host country).[16] Table 5 presents the corresponding estimation results for our fully specified model.

Indicating the robustness of our findings, results presented in Table 5 indicate that our conclusions regarding the respective effects of cultural differences and the stock of immigrants on bilateral trade costs remain unchanged even when we account for the variances in the trade cost orientation of the trading partners. The trade cost-offsetting effects of an increase in the immigrant stock from a typical home country that resides in a typical host country also remain unchanged. Accordingly, we find that the marginal effects of a one per cent increase in the stock of immigrants, computed at the respective means of all other variables, corresponds with 0.0826 per cent, 0.090 per cent, and 0.039 per cent reductions (when using cultural distance) and 0.0825 per cent, 0.114 per cent, and 0.023 per cent reductions (when using genetic distance) in trade costs at aggregate levels, and across the manufactures and agricultural products, respectively. While not statistically significant, it is, however, worthwhile to note that the marginal effects estimated the mixed effects model (as compared to results from the panel random effects) are generally lower; this is so because the model accounts for relative differences in the bilateral trade costs of the country pairs and their regional locations.

TABLE 5

TRADE COSTS, CULTURAL DIFFERENCES, AND IMMIGRANTS: ESTIMATION RESULTS FROM MULTILEVEL MIXED EFFECTS MODEL

Variables	Estimation Results Controlling for Cultural Differences using Cultural Distance			Estimation Results Controlling for Cultural Differences using Genetic Distance		
	Total Trade Costs	Manu. Trade Costs	Agri. Trade Costs	Total Trade Costs	Manu. Trade Costs	Agri. Trade Costs
Landlocked (Home)	0.177***	0.164***	0.235***	0.180***	0.161***	0.233***
	(0.0098)	(0.0104)	(0.0121)	(0.0071)	(0.0075)	(0.0093)
Landlocked (Host)	0.258*	0.228*	0.225*	0.227***	0.193**	0.320***
	(0.122)	(0.123)	(0.128)	(0.0732)	(0.0827)	(0.0891)
ln Geodesic $Distance_{ij}$	0.115***	0.139***	0.193***	0.0848***	0.112***	0.168***
	(0.0061)	(0.0063)	(0.0066)	(0.0056)	(0.0058)	(0.006)
ln Economic $Remoteness_{it}$	0.146***	0.132***	−0.00740	0.187***	0.176***	0.00784
	(0.0084)	(0.0087)	(0.0092)	(0.0077)	(0.0080)	(0.0084)
ln Economic $Remoteness_{jt}$	−0.800***	−1.313***	−0.230***	0.256***	0.186***	0.0203
	(0.132)	(0.157)	(0.0840)	(0.0522)	(0.0584)	(0.0611)
Common National $Borders_{ij}$	−0.374***	−0.320***	−0.302***	−0.458***	−0.414***	−0.334***
	(0.0198)	(0.0208)	(0.0209)	(0.0208)	(0.0219)	(0.0212)
Common Official $Language_{ij}$	−0.0512***	−0.0625***	−0.0181	−0.0857***	−0.0819***	−0.0799***
	(0.0133)	(0.0139)	(0.0146)	(0.0106)	(0.0113)	(0.0115)
Past Colonial $Relationship_{ij}$	0.0143	0.0351**	−0.00908	−0.0526***	−0.0397**	−0.0744***
	(0.0170)	(0.0177)	(0.0179)	(0.0158)	(0.0166)	(0.0161)
Mutual Trade $Agreement_{ijt}$	−0.131***	−0.125***	−0.162***	−0.200***	−0.202***	−0.180***
	(0.0096)	(0.01)	(0.0104)	(0.0087)	(0.0091)	(0.0095)
ln Cultural Difference[1] $_{ij}$	0.254***	0.263***	0.176***	0.0527***	0.0483***	0.0362***
	(0.0083)	(0.0087)	(0.0098)	(0.0033)	(0.0034)	(0.0039)
ln Immigrants $_{ijt}$	−0.0882***	−0.0900***	−0.0941***	−0.0821***	−0.0833***	−0.119***
	(0.0058)	(0.0064)	(0.0067)	(0.0066)	(0.0066)	(0.0092)
ln Cultural $Diference_{ij}$ × ln $Immigrants_{ijt}$	−0.0100***	−0.0111***	0.0325	−0.0026**	−0.0031***	0.0393***
	(0.0026)	(0.0027)	(0.0031)	(0.0010)	(0.0011)	(0.0013)
Constant	9.030***	13.13***	5.760***	0.649	1.047**	3.836***
	(1.045)	(1.286)	(0.663)	(0.414)	(0.462)	(0.484)
Random Intercepts:						
Std. Dev (Regional Intercepts)	12.39	1.183	17.27	3.948***	4.078***	3.455***

TABLE 5

(CONTINUED)

Variables	Estimation Results Controlling for Cultural Differences using Cultural Distance: Total Trade Costs	Manu. Trade Costs	Agri. Trade Costs	Estimation Results Controlling for Cultural Differences using Genetic Distance: Total Trade Costs	Manu. Trade Costs	Agri. Trade Costs
(St. Error)	(29.39)	(1.007)	(15.25)	(0.199)	(0.203)	(0.192)
Std. Dev. (Home-Host Intercepts)	3.910***	3.816***	3.775***	2.195***	2.086***	2.134***
(St. Error)	(0.282)	(0.215)	(0.239)	(0.201)	(0.193)	(0.214)
Random Coefficents:						
Std. Dev. (ln Immigrant Stocks)	0.675***	0.418*	1.533***	1.087***	1.053***	1.095***
(St. Error)	(0.247)	(0.238)	(0.299)	(0.0671)	(0.0572)	(0.0664)
Std. Dev. (Residuals)	0.694*	0.473	0.627**	0.299	0.204	0.0610
(Std. Error)	(0.411)	(0.305)	(0.285)	(0.351)	(0.346)	(0.354)
Log Likelihood	−2,915	−3,236	−2,927	−5,491	−5,799	−4,021
Wald-Chi^2	9,061	8,695	6,425	10,185	9,965	6,946
Observations	9,294	9,134	7,972	16,056	15,440	11,672

[1]Cultural distance (in the first three columns) and Genetic distance (in the last three columns) were used to approximate Cultural Differences. Robust standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

CONCLUSION

Culture profoundly influences how people think, communicate, and behave. It has the potential to affect the kinds of transactions they make and the way they negotiate. Differences in culture may, therefore, increase trade-related transaction costs, and/or create barriers that impede the completion of trade deals. Given their potential to bridge cultural differences, immigrants, on the other hand, may mediate the associated costs. Evaluating these relationships, we provide the first direct empirical test of the influences of immigrants and cultural differences (measured using alternative variables: cultural distance, a temporal measure, and genetic distance, a time-invariant measure of cultural differences transmitted over generations) on bilateral trade costs. In addition to capturing cultural differences extended over generations, our use of genetic distance as a proxy for cultural differences permits the inclusion of a larger number of countries in the analysis as compared to earlier works. However, given the unsettled nature of the extent to which genetics affects culture, we also use cultural distance that permits temporal variation in the differences. Thus, our approach is novel and our results are more comprehensive than related studies. While we obtain results from the application of the standard random effects panel data estimation approach, we assess their robustness by using results obtained from the application of a multi-level mixed effects model that accounts for variation in the trade orientation of the countries in our sample.

Examining the determinants of bilateral trade costs for 19 OECD member countries that host immigrants from the respective OECD members and 147 non-OECD home countries for which relevant data on stocks of immigrants covering the period from 1995 through 2010 are available, we find that trade costs rise with cultural differences and decrease with increases in the stock of immigrants. At the margin, the trade cost-reducing effects of immigrants are found to increase, although at varying degrees, as we move from the lowest to highest observed values along the cultural differences contour. The observed trade cost-reducing effects of immigrants hold both at the aggregate level and across the sectors; however, considerable differences exist in the observed patterns of immigrants' marginal effects across the sectors: an increasing marginal effect is found for manufactures and a decreasing effect is found for agricultural products. While this variation is, perhaps the result of differences in the proportion of total trade costs attributable to cultural differences across the different sectors, the rise in the marginal trade cost-reduction effects of immigrants at higher levels of cultural divergence both at the aggregate level and for manufactures has implications relevant for academic and practical purposes related to immigration and commercial policies.

After controlling for the influence of trade resistance factors such as geographic differences, the observation that trade costs rise with cultural differences indicates that even as economies become more integrated, cultural differences still account for a significant amount of trade-related transaction costs. Additionally, in the face of the declining trade costs associated with geographic distance between countries, developing countries continue to face significant hurdles to internalize the benefits of international trade. Thus, immigrants can potentially play a significant role in enhancing the economic integration of their home countries with the rest of the world. That is, beyond providing information, enforcing contracts, facilitating communication, and easing the difficulty involved in the initiation and completion of trade deals, the ability of immigrants to bridge cultural differences contributes to significant reductions in trade costs, particularly among home and host countries that are culturally more divergent. Finally, as Spolaore and Wacziarg (2013) note, given that inherited human characteristics transmitted across generations have significant long-run economic implications, from a purely academic perspective, our finding that the marginal trade costs reduction effects of immigrants is higher at higher levels of cultural differences implies that existing research, which attributes the ability immigrants to increase trade flows to information provision and enforcement in lax contract environments fails to reflect fully the economic influences of immigrants. Future studies that quantify the extent of this and related effects may thus aid in shaping the often contentious debate related to national immigration policies.

NOTES

1 These abilities may be critical for the initiation and completion of trade deals and for the enforcement of contracts.

2 Desmet et al. (2006) show a strong and robust correlation between genetic distance and an index of cultural differences computed using answers to questions on perceptions of life, family, religion, and morals from the 2005 World Value Surveys.

3 In biological terms, genetic distance is a term used to describe the number of differences or mutations between two sets of Y-chromosome DNA or mitochondrial DNA test results. A genetic distance of zero implies an exact match. Taking this notion into account, Spolaore and Wacziarg (2009) state that genetic distance measures the difference in gene distributions between two populations, where the genes under considerations change randomly and are independent of selection pressure.

4 See Genc et al. (2011) and White and Tadesse (2011) for surveys of the literature on the immigrant-trade relationship.

5 There is debate concerning the appropriateness of genetic distance as a proxy for cultural differences. For example, Guiliano et al. (2014) argues that genetic distance is a proxy variable that represents transportation costs. Guiso et al. (2009), however, point to Desmet et al. (2006) who report that genetic distance is strongly correlated with several measures of cultural distance.

6 Arvis et al. (2013) compute the bilateral trade costs as $\tau_{ij} = \sqrt{\frac{t_{ij}t_{ji}}{t_{ii}t_{jj}}} - 1 = \left(\frac{x_{ii}x_{ii}}{x_{ij}x_{ji}}\right)\left(\frac{x_{ii}x_{ii}}{x_{ij}x_{ji}}\right)^{\frac{1}{2(\sigma-1)}} - 1$, where $\tau_{ij}$is geometric average comprehensive trade costs between countries i and j and t_{ij} and x_{ij} are trade costs from countries i to j and country i's consumption of products from country j, respectively, and σ denotes the elasticity of substitution.

7 Tadesse and White (2010a) provide extensive discussion of the resulting values.

8 This is particularly important as both the stock of immigrants from a given home that reside in a given host and the cultural differences among different pairs of countries varies greatly. In addition, to check the consistency of our results, we provide estimation results obtained from several alternative specifications of the above model.

9 Internal distance, when k = j, is calculated as $0.4 \times \sqrt{Land\ Mass_i}$ (Head and Mayer, 2000).

10 We choose to rely on the random effects results as the Hausman test fails to reject the null hypothesis of no correlation between the regressors and the effects, implying that home-host-country-specific effects are adequately modeled by a random-effects model.

11 The data used to construct this measure of cultural distance are from the third (1995-1998), fourth (1999-2004), and fifth (2005-2009) waves of the World Values Survey.

12 The test for joint significance is of the coefficients of a variable and its interaction term in the same specification is given as $z = \frac{\widehat{\beta}_{IMMG} + \widehat{\beta}_{(\ln CDIST \times \ln IMMG)}}{\sqrt{sqrt(VAR(\widehat{\beta}_{\ln IMMG}) + VAR(\widehat{\beta}_{(\ln CDIST \times \ln IMMG)}) + 2 \times COVAR(\widehat{\beta}_{\ln IMMG}, \widehat{\beta}_{(\ln CDIST \times \ln IMMG)})}}$

13 Albeit minor but statistically insignificant changes in the coefficient of a few of the control variables, rescaling the immigrant stock variable using the population sizes of the home/host countries yield an almost identical result. Evaluating for potential non-linearity of the effects, the coefficient of the quadratic term (share of immigrant stock in the population) was not significantly (at $p< 0.001$) different from zero.

14 The total number of observation in the regressions using cultural distance are small due to the time varying values of cultural distance data not being available for all countries in the data.

15 As both cultural distance and genetic distance are measured in natural logs, our use of the word "contour" is intentional.

16 The composition of immigrants from a given home country who reside in a given host country may vary due to self-selection (immigrants choosing which host to migrate to) and the criteria used by the host country in admitting immigrants from various home countries. The mixed effects random coefficients model thus, enables us to account for variation in the potential effect of immigrants arising from differences in their composition.

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APPENDIX

Country listing: Afghanistan, Albania[a], Algeria[a], Angola, Antigua and Barbuda, Argentina[a], Armenia[a], Australia[a,b], Austria[a,b], Azerbaijan[a], Bahamas, Bahrain, Bangladesh[a], Barbados, Belarus[a], Belgium and Luxembourg[a], Belize, Benin, Bhutan, Bolivia, Botswana, Brazil[a], Brunei Darussalam, Bulgaria[a], Burkina Faso[a], Burundi, Cambodia, Cameroon, Canada[a,b], Cape Verde, Central African Republic, Chad, Chile[a], China[a], Colombia[a], Comoros, Congo, Costa Rica, Croatia[a], Cuba, Cyprus[a], Czech Republic[a], Côte d'Ivoire, Denmark[a,b], Dominica, Dominican Republic[a], Ecuador, Egypt[a], El Salvador[a], Equatorial Guinea, Eritrea, Estonia[a], Ethiopia[a], Fiji, Finland[a,b], France[a,b], Gabon, Gambia, Georgia[a], Germany[a,b], Ghana[a], Greece[a], Grenada, Guatemala[a], Guinea, Guyana, Honduras, Hong Kong[a], Hungary[a], Iceland[a], India[a], Indonesia[a], Iran[a], Iraq[a], Ireland[a,b], Israel[a], Italy[a,b], Jamaica, Japan[a,b], Jordan[a], Kazakhstan, Kenya, Kiribati, Korea (Rep. of)[a], Kuwait, Kyrgyzstan[a], Lao People's Democratic Republic, Latvia[a], Lebanon, Lesotho, Liberia, Lithuania[a], Luxembourg[a,b], Macedonia (the Former Yugoslav Rep. of)[a], Madagascar, Malawi, Malaysia[a], Maldives, Mali[a], Malta[a], Mauritania, Mauritius, Mexico[a], Moldova (Rep. of)[a], Mongolia, Morocco[a], Mozambique, Namibia, Nepal, Netherlands[a,b], New Zealand[a], Nicaragua, Niger, Nigeria[a], Norway[a,b], Oman, Pakistan[a], Panama, Papua New Guinea, Paraguay, Peru[a], Philippines[a], Poland[a], Portugal[a,b], Qatar, Russian Federation[a], Rwanda[a], Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Saudi Arabia[a], Senegal, Seychelles, Sierra Leone, Singapore[a], Slovakia[a], Slovenia[a], South Africa[a], Spain[a,b], Sri Lanka, Suriname, Swaziland, Sweden[a,b], Switzerland[a,b], Syrian Arab Republic, Tajikistan, Tanzania (United Rep. of)[a], Thailand[a], Togo, Tonga, Trinidad and Tobago[a], Tunisia, Turkey[a], Turkmenistan, Uganda, Ukraine[a], United Arab Emirates, United Kingdom[a,b], United States of America[a,b], Uruguay[a], Uzbekistan, Vanuatu, Venezuela[a], Viet Nam[a], Yemen, Zambia[a], and Zimbabwe.

Trade costs data are available for all countries listed. Genetic distance data are available for all listed countries except the Maldives, Sao Tome and Principe, and Yemen. The superscript "a" denotes availability of both genetic distance data (from Spolaore and Wacziarg, 2009 and 2011) and cultural distance data (from the World Values Survey), while the superscript "b" identifies OECD member host countries.