

# Does bilateral trust across countries really affect international trade and factor mobility?

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**Abstract** This paper examines whether bilateral trust across countries affects international trade and migration. Following Guiso et al. (Q J Econ, 2009; henceforth GSZ), we capture the exogenous variance in bilateral trust by measuring physical dissimilarities (‘somatic distance’) between country pairs. We employ seven alternative somatic distance indicators in addition to the one by GSZ. As they are all equally valid instruments, it should not matter in two-stage least-squares estimations which one of them we use at the first stage. However, bilateral trust significantly affects international trade only if employing the indicator by GSZ. In the context of international migration, bilateral trust never enters significantly at the second stage. Overall, we find little evidence that bilateral trust and/or cultural proximity affect international trade or migration.

**Keywords** Bilateral trust · Cultural proximity · International migration · International trade · Somatic distance

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**JEL Classification** F10 · F22 · Z10**1 Introduction**

The role of cultural proximity and trust in economic exchange is a long-standing issue that has attracted renewed interest in the more recent literature. For instance, there is extensive research on the commonality of language for international trade and factor mobility. In a widely read contribution, Guiso et al. (2009, henceforth GSZ) alluded to a different role of cultural proximity in international economic exchange running through trust considerations. They present empirical evidence, suggesting that the higher average trust that citizens of a country importing goods have in citizens of their partner country, which is referred to as ‘destination-to-source (DtS) trust’, has a significant and economically important causal effect on bilateral trade across countries. To address endogeneity concerns, GSZ aim to isolate the exogenous variation in DtS trust with two indicators, a measure of physical dissimilarities between the ‘representative’ individuals in two countries (called ‘somatic distance’) and a measure of religious similarity. GSZ acknowledge that these instruments may affect international trade via cultural and institutional channels other than bilateral trust, questioning the validity of their identification strategy. Yet, they argue that their positive and significant IV coefficient on DtS trust is evidence that cultural proximity is an important determinant of international trade, even if the instruments do not satisfy the exclusion restriction.

First, this article reconsiders the relationship between bilateral trust and international trade flows in an attempt to replicate the results of GSZ by thorough sensitivity analysis.<sup>1</sup> In fact, there is a large degree of freedom when constructing an indicator of somatic distance that may serve as an instrument for bilateral trust. The robustness of their IV results is examined by defining seven alternative measures of somatic distance in addition to the one used by GSZ and by estimating the reduced-form equation where trade flows are regressed on all explanatory variables and on somatic distance and religious similarity. As all somatic distance indicators are equally valid and strong instruments, it should not matter for consistent IV estimates which indicator is chosen to instrument bilateral trust with. Using the identification strategy of GSZ and employing their somatic distance indicator as an instrument, the estimation results suggest that an increase of one standard deviation in instrumented DtS trust increases aggregated export flows by 24 % on average. This basically replicates their original finding. However, neither the alternative somatic distance measures nor religious similarity are significant when estimating the reduced-form equation. Moreover, according to Fehr (2009), religious similarity in particular may violate the exclusion restriction when examining the relationship between bilateral trust and international trade. When

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<sup>1</sup> Trade is often characterised by incomplete contracts as it is too costly to take into account or even know all contingencies when establishing them. Furthermore, it can be difficult to negotiate, monitor, and enforce contracts, especially in international trade where the commercial partners are established in different jurisdictions (Rodrik 2000). As a result, profitable trade opportunities might not be realised, unless the parties trust each other (Akerlof 1970; Arrow 1972; Putnam 1993; Greif 1993, 2000; Coleman 1994; Kollock 1994; Fukuyama 1995; Knack and Keefer 1997; Paldam 2000; Dyer and Chu 2003).

not excluding religious similarity at the second stage of the IV estimation, the coefficient of bilateral trust becomes insignificant and its magnitude declines considerably, sometimes even becoming negative, as soon as it is not instrumented with the original indicator used by GSZ. Thus, although not all of the possible identification problems in the analysis by GSZ can be solved, the main contribution of this article regarding international trade is to show that the conclusion reached by GSZ cannot be supported using their approach.

The second part of this article focuses on the relationship between bilateral trust and international migration.<sup>2</sup> Potentially, trust in the citizens of a host country may have an impact on the decision to migrate to a foreign country. Generally, individuals only migrate to a foreign country if the expected migration benefits exceed the expected migration costs. However, forming such expectations is difficult because migrants are generally not fully aware of the economic, social, political, institutional, and cultural environment of potential host countries. In such a context, their decision to migrate may also rely on the trust they generally have in citizens of the destination country. This bilateral trust, which is referred to as ‘source-to-destination (StD) trust’, might change the way expectations about the costs and benefits of moving abroad are formed. Thus, there is some reason to believe that StD trust may directly affect international migration by changing its expected net return. Likewise, the trust that citizens from the destination country grant citizens from the source country (i.e. DtS trust) may play a role in the migration decision. For instance, it may affect immigration policies towards specific countries or regions.

To test these hypotheses, a structural equation is derived from a random utility maximisation model. This equation is then estimated using the IV strategy suggested by GSZ, and the robustness of the results is examined using a sensitivity analysis similar to the one used in the context of international trade. When using any of the eight measures of somatic distance as the sole instrument, we are unable to find a significant and quantitatively important effect of bilateral trust on migration flows.

The rest of the article is organised as follows. The next section gives a brief account of the literature concerning trust effects on macroeconomic outcomes. Section 3 analyses the causal effect of bilateral (DtS) trust on international trade, extensively discussing the empirical model and identification strategy before presenting the results. Section 4 proposes a structural model and similar identification strategy to analyse the effects of both StD and DtS trust on international migration and presents empirical results. The last section consists of the conclusion.

## 2 Related literature

This article is part of a growing literature that analyses the role of cultural proximity and trust in economic outcomes. This section focuses on empirical studies employing

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<sup>2</sup> GSZ studied the effect of trust on international capital flows, in addition to trade flows, but did not consider international labour migration. Future research may attempt replicating the findings of GSZ with respect to international capital mobility.

aggregate data and ignores the microeconomic trust literature that is largely based on the experimental data, on which [Fehr \(2009\)](#) provides an excellent survey.

Comparing Italian regions, [Putnam \(1993\)](#) finds that intra-regional trust increases participation in social activities, facilitates cooperation, and improves the effectiveness of institutions.<sup>3</sup> More recently, empirical studies suggest that trust within a region fosters economic development and growth through its positive effect on total factor productivity ([Bjornskov 2006](#)), on financial development ([Guiso et al. 2004, 2008b](#)), and on the rate of investment ([Knack and Keefer 1997; Zak and Knack 2001](#)). [Algan and Cahuc \(2010\)](#) and [Tabellini \(2010\)](#) find a causal effect of inherited and historically determined ‘general’ trust (proposed by the World Values Surveys) within regions on economic growth. By contrast, this article is concerned with the effects of bilateral (i.e. inter-regional) trust on the bilateral movement of goods and labour.

The related literature on the role of cultural proximity in international trade and migration has largely focussed on the role of common language, using various indicators (e.g. [Falck et al. 2012; Isphording and Otten 2013; Egger and Lassmann 2013; Melitz and Toubal 2014; Chiswick and Miller 2015](#)). To examine the role of bilateral trust (possibly through somatic distance and religious similarity) across countries in international migration patterns, we follow [Bertoli and Moraga \(2013\)](#) and [Ortega and Peri \(2013\)](#), and derive a structural equation from a random utility maximisation model (see also [Roy 1951; Sjaastad 1962; Anderson 1979; Borjas 1987, 1989](#)). This approach has also been used recently to examine the determinants of migration flows, for instance, migration policies ([Mayda 2010; Ortega and Peri 2013](#)), the variations in migration flows to the United States over time ([Clark et al. 2007](#)), the role of networks in the decision to move abroad ([Pedersen et al. 2008; Beine et al. 2011](#)), the sorting and selection of potential migrants ([Grogger and Hanson 2011](#)), the role of climatic factors ([Beine and Parsons 2012](#)), and the role of similar religious backgrounds in international migration ([Spring 2014](#)).

### 3 Bilateral trust and international trade

This section presents the model, the data, and the identification strategy employed to investigate the relationship between DtS trust and international trade flows.

#### 3.1 Trade equations and data

The gravity-type specification of trade that includes DtS trust as regressor comes from GSZ:<sup>4</sup>

$$\log(\text{export}_{sd,t}) = \beta_0 + \beta_1 \text{trust}_{dst} + \mathbf{X}'_{sd} \gamma + \lambda_{st} + \lambda_{dt} + \epsilon_{sd,t}, \quad (1)$$

<sup>3</sup> On trust and institutions, see also [La Porta et al. \(1997\)](#), [Alesina and La Ferrara \(2000\)](#), [Bjornskov \(2006\)](#), [Tabellini \(2008, 2010\)](#), [Bloom et al. \(2009\)](#), and [Aghion et al. \(2010\)](#).

<sup>4</sup> For a short overview of the origin of the gravity model and the corresponding literature, see [Anderson \(1979, 2011\)](#), [Anderson and van Wincoop \(2003\)](#), [Baldwin and Tagliani \(2006\)](#), [Head and Mayer \(2013\)](#), and [Felbermayr et al. \(2015\)](#).

where the dependent variable,  $\log(\text{export}_{sdt})$ , is the natural logarithm of the aggregated commodity export flows from country  $s$  to country  $d$  in year  $t$ ;<sup>5</sup>  $\text{trust}_{dst}$  is the average DtS trust observed in year  $t$  across individuals in country  $d$ , which participated in a Eurobarometer survey, given to citizens in country  $s$ , according to the answer to the following question: ‘I would like to ask you a question about how much trust you have in people from various countries. For each, please tell me whether you have a lot of trust, some trust, not very much trust, or no trust at all’. It was asked in the years 1970, 1976, 1980, 1983, 1986, 1990, 1991, 1993, 1994, and 1996, with the sample size increasing over time.<sup>6</sup> Analogously to the study by GSZ, the individual answers are coded as 1 (no trust at all), 2 (not very much trust), 3 (some trust), and 4 (a lot of trust). For reasons of comparability, we follow GSZ and focus on countries that were members of the European Economic Area before 1997 and Norway.  $\mathbf{X}'_{sd}$  is a vector of time-invariant bilateral variables that capture trade costs (Anderson and van Wincoop 2004). It includes dummy variables that take the value one whenever two countries share a border, an official language, or when their legal systems have the same origins.<sup>7</sup> Following GSZ, we further include an indicator of press coverage that measures how many times a partner country was mentioned in the national newspapers,<sup>8</sup> a proxy for transportation costs<sup>9</sup> and a measure of common linguistic roots, which can take values between zero and one:<sup>10</sup> it is one whenever two countries share an official language, zero when the two official languages come from different language families and takes values between zero and one whenever the official languages share some common nodes. Finally, two different measures of geographical distance between country pairs are employed. First, we use the indicator for geographical distance proposed by Frankel et al. (1995) that was also employed by GSZ. This indicator measures the (log) distance in kilometres between two capital cities and assumes that the whole population is concentrated in one geographical point, thereby failing to capture the distribution of economic activity within a country. This distance measure is only used for direct comparison with the results of GSZ as Head and Mayer (2002) argue that the inclusion of such an unweighted distance measure in a gravity-type equation systematically inflates the estimated border effect because it overestimates the geographical distances

<sup>5</sup> Aggregated commodity export flows are taken from the UN Comtrade Database; <http://comtrade.un.org/db/default.aspx>. Unfortunately, data on trade in services cannot be included as it has only been collected since the year 2000. There are no zero-trade observations for the country sample included in the analysis.

<sup>6</sup> See <http://zacat.gesis.org/webview/>. In 1996, citizens of 17 European countries were asked to indicate the trust they had in citizens of 25 EU and non-EU countries.

<sup>7</sup> These dyadic dummy variables come from the CEPII Gravity Data set generated by Head, Mayer and Ries (2010, 2013); see [www.cepii.fr](http://www.cepii.fr).

<sup>8</sup> The measure is based on the data from [www.factiva.com](http://www.factiva.com), which collects and archives information made available by over 30,000 newspapers, journals, magazines, Web pages, etc., on a broad range of contents from over 200 countries. It is constructed as follows: ‘In Factiva, we searched the newspaper with the highest circulation for each country. For each pair of countries  $i$  and  $j$ , we recorded the number of articles in the newspaper of countries that mentioned country  $j$  or its citizens in the headline. We divided this number by the number of total news stories on foreign countries’ (GSZ; p. 1106).

<sup>9</sup> We employ the prices of shipping a 1,000 kg unspecified freight type load with no special handling in June 2011, as provided at <http://importexportwizard.com>. This measure is based on Giuliano et al. (2006).

<sup>10</sup> Data are drawn from [www.ethnologue.com](http://www.ethnologue.com), also see Lewis et al. (2014).

within a country relative to international distances. Therefore, the second measure of geographical distance between country pairs employed in this article is the one provided by Mayer and Zignago (2011), which is a population-weighted indicator of distances between big cities.  $\lambda_{st}$  and  $\lambda_{dt}$  are time-varying country dummies that account for country- and time-specific determinants of international trade. According to Baldwin and Taglioni (2006), these dummies mitigate the bias stemming from the omission of what Anderson and van Wincoop (2004, 2003) call ‘multilateral resistance’ to trade. The last term in equation (1),  $\epsilon_{sdt}$ , is a mean-zero random variable. The computed standard errors are robust to heteroscedasticity of unknown and arbitrary form. Moreover, they are clustered at the country pair which allows the standard errors to be correlated over time within country pair, but assumes that they are uncorrelated with errors of a different country pair.

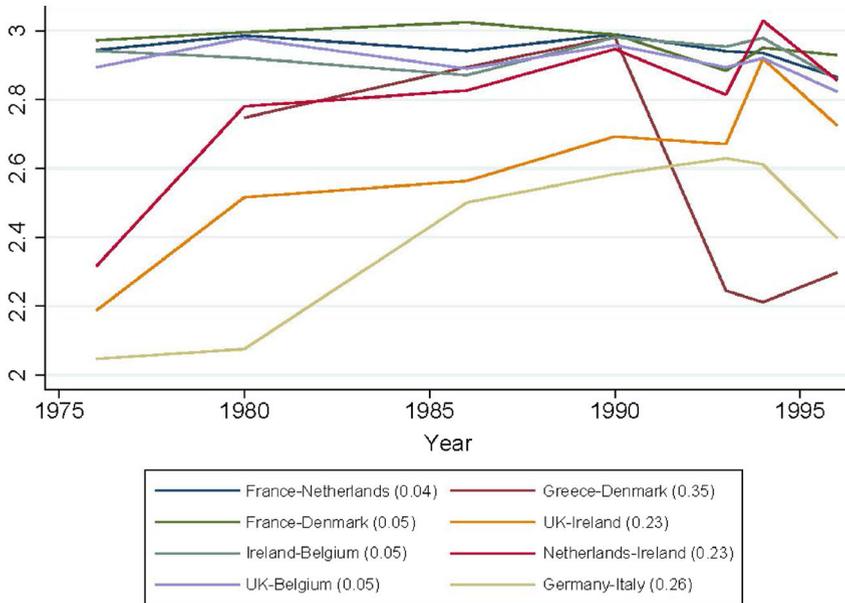
### 3.2 Identification and instrumental variables

A particular concern is the potential inconsistency of the OLS estimate of the coefficient  $\beta_1$  on DtS trust ( $\text{trust}_{dst}$ ). This might be caused by omitted variables and measurement errors, especially since the variable is based on the survey data. GSZ instrument  $\text{trust}_{dst}$  with a time-invariant proxy of religious similarity and a time-invariant indicator of somatic distance measures the distance between three anthropometric characteristics observed in the native populations of two countries: the average height, the prevailing hair colour, and the average cephalic index, which measures the average width and length of an individual’s skull. In his experiment, DeBruine (2002) finds that people trust other people who resemble themselves significantly more. A decrease in somatic distance should thus increase bilateral trust. The second instrument, religious similarity, measures the probability that a randomly chosen individual in country  $d$  has the same religion as a randomly chosen individual in country  $s$ . As religiously similar individuals may share common values and beliefs, an increase in the variable may positively affect bilateral trust.

The employed instruments are time-invariant, whereas the trust measure is not. In fact, the trust variable varies over time in a non-negligible manner. Figure 1 displays the evolution of DtS trust over time for selected country pairs with comparably high and low fluctuations. For instance, average Greek-to-Danish trust fluctuated considerably over time, with a standard deviation of 0.35 across the various available years (reaching 2.56 on average). The average German-to-Italian trust and its standard deviation over time is 2.41 and 0.26, respectively. By contrast, French-to-Dutch trust (2.94 on average) and French-to-Danish trust (2.96 on average) are pretty stable over time; their standard deviations are only 0.04 and 0.05, respectively.

One advantage of the instrumentation strategy may be seen in the attempt to elicit the culturally rooted (thus stable) and ideally exogenous component of bilateral trust. GSZ provide survey evidence from additional questions that separate risk and trust considerations; the correlation patterns of the employed DtS trust variable suggest that it indeed ‘reflects the subjective probability that a random person is trustworthy’ (GSZ, p. 1100).

The construction of the instruments, their potential problems, and the contribution to identify the causal effect of DtS trust on international trade flows is discussed next.



**Fig. 1** Bilateral trust over time in examples of country pairs. *Notes:* this figure illustrates bilateral trust between country pairs over time with the highest and lowest standard deviations, given that bilateral trust was observed over at least 6 years (Eurobarometer surveys)

### 3.2.1 Religious similarity

The first employed instrument for DtS trust, an indicator for religious similarity, is constructed with data from the World Value Surveys presented by Guiso et al. (2003). They report the national distribution of population by the following religious affiliations: Catholic, Protestant, Jewish, Muslim, Hindu, Buddhist, no religious affiliation, and other affiliations. This information is used to compute the probability that two randomly chosen individuals in two different countries have the same religion. However, religious similarity may not satisfy the exclusion restriction. First, as Fehr (2009, p. 259) states: ‘Common religion not only influences trust, but does many other things as well, because it is probably associated with more frequent interactions between the two countries, compared to cases with different religions, and this may well have a direct impact on trade’. Second, there is reason to believe that religiously similar people share preferences for certain tradable goods. An obvious example concerns preferences for food. For instance, a Muslim living in Switzerland might import meat from France (where there is a large Muslim community) because he or she only eats ‘halal’ meat.

Because potential validity problems are particularly severe when religious similarity is employed to instrument bilateral trust, specifications in which religious similarity enters as a control variable in the trade regression rather than being excluded at the second stage of the IV estimations are preferred.

### 3.2.2 Somatic distance

Indicators of somatic distance, used by GSZ as a second instrumental variable for bilateral trust, can be constructed in many different ways. Four measures are made available in the online appendix to the paper by GSZ (Guiso et al. 2008a).<sup>11</sup> They are constructed based on four anthropometric indicators: hair colour, cephalic index, height, and skin colour. The first three anthropometric indicators were published by Biasutti (1959). He classifies the world into five categories of hair colours: 1 (blond prevails), 2 (mix of blond and dark), 3 (dark prevails), 4 (sporadic presence of blond), and 5 (exclusively dark). He further differentiates five categories of average cephalic indexes, going from 71.0 to 86+, and six categories of height. For illustration, Fig. 2 reprints the distribution of the average cephalic index for European regions from Biasutti (1959).

Using today's borders, the populations of many countries have several of these traits, in which case GSZ focus on the predominant category and ignore the others. They assign scores to the different groups of hair colours, cephalic indices, heights, and skin colours and 'compute the somatic distance between two countries as the sum of the absolute value of the difference in each of these traits' (GSZ, p. 1107). Their constructed four measures of somatic distance are all computed in the same fashion but are based on different combinations of these four physical characteristics. One measure of somatic distance sums the absolute distance in all four dimensions. The sole measure used in the estimations of GSZ ignores the difference in skin colour. Another measure is based on the differences in hair colour, height, and skin colour. Finally, yet another measure only sums the absolute differences in hair colour and height.

We construct four additional measures of somatic distance. To do this, the score of 1 is assigned to the category corresponding to the lowest average cephalic index (71.0–74.9), 2 to the second category (75.0–78.9), and so on. The six categories of height defined by Biasutti (1959) are coded the same way, assigning the lowest score of 1 to the category '157.9 cm or less' and the highest score of 6 to '178 cm or more'. First, the instructions given by Guiso et al. (2008a, p. 3) are followed exactly in order to try replicating the single measure of somatic distance used by GSZ. The second measure is based only on the absolute differences in hair colour and height, as it is hardest to define which category of cephalic index prevails. The next two measures differ from the others by allowing a country to fall into two categories and weighting them according to population density.<sup>12</sup> One measure is again based on

<sup>11</sup> See [www.kellogg.northwestern.edu/faculty/sapienza/htm/somaticdistance.zip](http://www.kellogg.northwestern.edu/faculty/sapienza/htm/somaticdistance.zip).

<sup>12</sup> For some countries, it is very difficult to decide which trait prevails, especially when focusing on the different categories of cephalic index. For example, in Fig. 2, northern Germany falls into category 3, '79.0–82.9', while the other half of Germany falls into category 4, '83.0–86.9'. Guiso et al. (2008a) do not indicate how they decide which one of these categories prevails in such situations. We partially succeed in replicating their somatic distances when we decide visually (based on Fig. 2) which trait covers a larger area and assume that it is the dominant characteristic. However, this procedure is somewhat arbitrary, especially when ignoring the distribution of the population. As the German population is approximately equally distributed, we would ignore the characteristics of half of the population if we arbitrarily decided that either category 3 or 4 prevails. To account for this, our two measures of somatic distance allow a country to be home to two categories of traits, depending on the distribution of the population. In the case

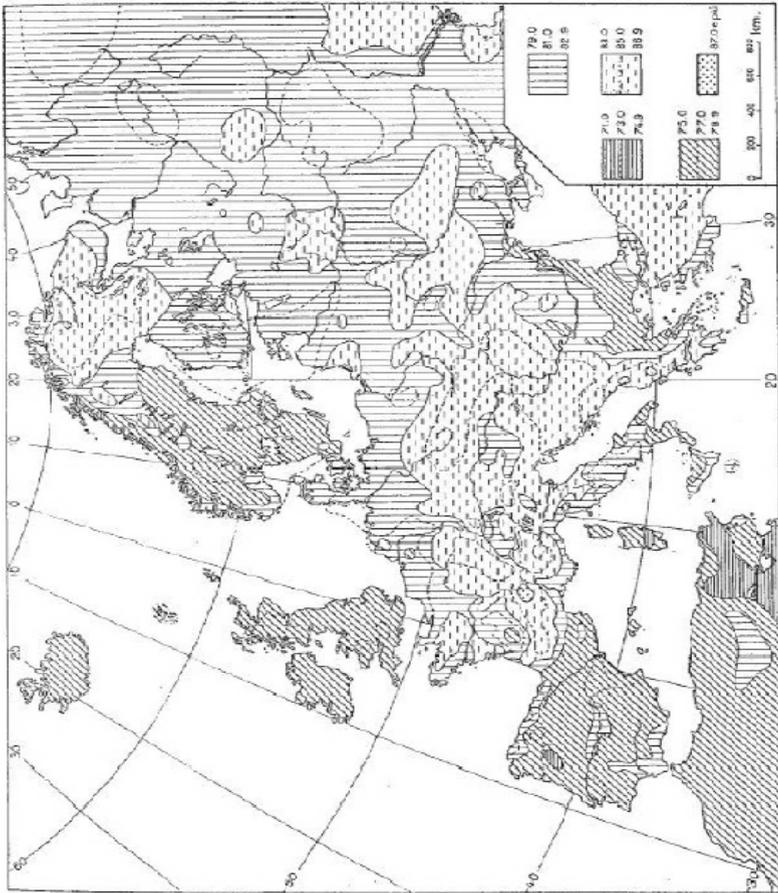


Fig. 2 Distribution of the average cephalic index in Europe. Source: Biasutti (1959, p. 48)

the three anthropometric indicators proposed by Biasutti, while the other ignores the differences in cephalic index. The data on population density come from two figures: a map with the population density in 1989 provided by the European Environment Agency and one with the population density in 2010 made available by the Nordic Center for Spatial Development.<sup>13</sup> Not surprisingly, the somatic distance measures are highly correlated (and we use only one of them at the same time in each regression). The correlation coefficients between two somatic distance measures vary from 0.65 to 0.93.<sup>14</sup>

Unfortunately, when instrumenting DtS trust only with somatic distance, the exogeneity of the instrument cannot be statistically verified. Yet, somatic distance might also affect international trade via cultural and institutional factors other than trust. To mitigate this concern, the migration regression includes dyadic variables that could be correlated with somatic distance, such as geographical distance between countries, common legal origin, and indicators of common language.<sup>15</sup> Additionally, somatic distance should not be highly related to these bilateral variables; otherwise, it may raise multicollinearity issues. To address this concern, the measure of common linguistic roots is regressed on somatic distance (one indicator per regression) in addition to the other time-invariant bilateral variables included in the analysis. The results of this regression suggest that common linguistic roots and somatic distance measures are negatively correlated, albeit the coefficient on somatic distance is not always significantly different from zero (see the online appendix). Moreover, the  $R^2$  of these regressions range from 0.55 to 0.58, further suggesting that multicollinearity is not a problem. Finally, when an endogenous variable is only instrumented with one variable, Murray (2006) suggests estimating the regression of interest again, using alternative instruments separately, and observing how the coefficient on the endogenous variable behaves. If this procedure yields estimates that only vary insignificantly from one another, then the credibility of the instrumental variable is strengthened. Such a sensitivity analysis can be performed here because there is a large degree of freedom in constructing a measure of somatic distance. The different indicators of somatic distance presented above all capture the physical dissimilarities between the ‘representative’ individuals in two countries and are constructed in a similar fashion. It should therefore not matter for consistent results which one of them is used to capture the exogenous variation in bilateral trust. The main contribution of this article is thus to perform a sensitivity analysis with respect to these alternative measures, thereby shedding light on the economic question of interest: does bilateral trust and, more

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Footnote 12 continued

of Germany, we find that the categories of cephalic index 3 (‘79.0–82.9’) and 4 (‘83.0–86.9’) roughly share the German territory and population. Therefore, we decide to assign it the score of 3.5. This measure is certainly not flawless, but it allows us to further explore the robustness of the results published in GSZ.

<sup>13</sup> See Stanners and Bourdeau (1994) or [www.eea.europa.eu/publications/92-827-5122-8/page008.html](http://www.eea.europa.eu/publications/92-827-5122-8/page008.html) for the chart on population density in 1989 and Roto (2011) or [www.nordregio.se/en/Maps--graphs/](http://www.nordregio.se/en/Maps--graphs/) for the population density in 2010.

<sup>14</sup> See the online appendix for a correlation matrix.

<sup>15</sup> Regarding the latter, in a sensitivity analysis (Sect. 3.4), we also employ other language-related measures provided by Melitz and Toubal (2014).

generally, cultural proximity affect international trade, according to the approach used by GSZ?

### 3.3 Results

The main results of estimating the trade regression are presented and discussed here. The descriptive statistics of the samples used to analyse the relationship between international trade and DtS trust are presented in Panel A of Table 1.

#### 3.3.1 Replicating GSZ: OLS estimates

Tables 2 and 3 present the results of estimating equation (1). In Table 2, the indicator of geographical distance between countries is similar to the one employed by GSZ (distance between two capital cities). In this case, the estimated coefficients on bilateral trust are very similar to the ones published in their study.<sup>16</sup> However, the coefficient on geographical distance is barely significant. As already mentioned, this might be the result of the inadequacy of the unweighted indicator measuring the distance between two capital cities. Indeed, when replacing it with the outlined population-weighted distance indicator in Table 3, the estimated coefficients on bilateral distance become significant and have point estimates close to  $-1$ , which corresponds to the magnitude generally estimated in trade regressions based on the gravity model (Mayer and Zignago 2011, p. 11). In addition, the estimated border effect decrease, supporting the suggestion made by Head and Mayer (2002) that measuring geographical distance by the distance between capital cities inflates the border effect. More importantly, when including a weighted measure of distance in the specification, the point estimates of the coefficients on DtS trust decrease. The positive OLS estimates reported in columns (1)–(3) of Table 3 are all insignificant. Notably, whereas GSZ (p. 1105, footnote 4) suggest that it does not matter much which geographical distance measure is used, our results suggest the opposite.

#### 3.3.2 Replicating GSZ: IV estimates

Next, as DtS trust is likely to be correlated with the error term, the IV approach proposed by GSZ is applied.<sup>17</sup> When instrumented with both the measure of religious similarity and the measure of somatic distance used by GSZ, the coefficient on DtS trust becomes significant at the 5% level (column (4) of Table 3). This suggests that an increase in DtS trust of one standard deviation increases aggregated commodity export flows on average by 24%, which is more than six times the effect predicted by the OLS estimate. Both instruments enter significantly in the first-stage regression. Bilateral trust seems to increase with religious similarity and is reduced when physical dissimilarities between two countries become more important. The  $p$ -value

<sup>16</sup> Compare to Table IV in GSZ (pp. 1116 f.).

<sup>17</sup> The endogeneity of bilateral trust is verified with a control function approach (see Wooldridge 2010, p. 127) and an endogeneity test that is robust to arbitrary heteroscedasticity, following Baum et al. (2007). Both tests reject the null hypothesis that bilateral trust is exogenous at conventional levels.

**Table 1** Summary statistics

Variable	Mean	Median	SD	Min	Max	N
<i>Panel A: international trade and destination-to-source trust</i>						
Export flows (from <i>s</i> to <i>d</i> , log)	14.56	14.63	1.64	9.57	17.88	679
DtS trust	2.73	2.72	0.28	1.99	3.65	679
Press coverage	0.04	0.02	0.05	0.00	0.31	679
Weighted distance (log)	7.00	7.06	0.55	5.08	8.13	679
Distance between capitals (log)	6.90	7.07	0.69	5.15	8.12	679
Transportation costs (log)	5.19	5.18	0.07	5.08	5.42	679
Common border	0.20	0.00	0.40	0.00	1.00	679
Common language	0.08	0.00	0.28	0.00	1.00	679
Same legal origin	0.31	0.00	0.46	0.00	1.00	679
Common linguistic roots	0.63	0.67	0.20	0.00	1.00	679
Religious similarity	0.34	0.33	0.25	0.00	0.87	679
<i>Somatic distance</i>						
Available in <a href="#">Guiso et al. (2008a)</a>						
Hair colour, height, cephalic index, skin	2.93	3.00	1.37	0.00	6.00	679
Hair colour, height, skin	2.05	2.00	1.29	0.00	5.00	679
Hair colour, height, cephalic index	2.48	2.00	1.20	0.00	5.00	679
Hair colour, height	1.60	2.00	1.08	0.00	4.00	679
Own elaboration, following the instructions in <a href="#">Guiso et al. (2008a)</a>						
Hair colour, height, cephalic index	2.35	2.00	1.21	0.00	5.00	679
Hair colour, height	1.48	2.00	0.96	0.00	3.00	679
Own elaboration, allowing for a country to fall into two categories of traits						
Hair colour, height, cephalic index	2.15	2.00	1.15	0.00	4.50	679
Hair colour, height	1.47	1.50	1.04	0.00	3.00	679
<i>Panel B: international migration and source-to-destination trust</i>						
Gross immigration flows (log)	6.84	6.84	1.87	2.08	12.13	450
StD trust	2.79	2.79	0.30	1.99	3.65	450
Diff. in GDP p.c. (%)	0.34	0.18	0.66	-0.62	3.55	450
Common language	0.09	0.00	0.28	0.00	1.00	450
Weighted distance (log)	6.91	7.01	0.62	5.08	8.13	450
Common border	0.21	0.00	0.41	0.00	1.00	450
Same legal origin	0.32	0.00	0.47	0.00	1.00	450
Migration stock 1960 (log)	4.86	0.00	5.56	0.00	13.50	450
Religious similarity	0.31	0.32	0.24	0.00	0.87	450
<i>Somatic distance</i>						
Available in <a href="#">Guiso et al. (2008a)</a>						
Hair colour, height, cephalic index, skin	2.87	3.00	1.40	0.00	6.00	450
Hair colour, height, skin	2.11	2.00	1.34	0.00	5.00	450
Hair colour, height, cephalic index	2.43	3.00	1.18	0.00	5.00	450
Hair colour, height	1.67	2.00	1.09	0.00	4.00	450

**Table 1** continued

Variable	Mean	Median	SD	Min	Max	N
Own elaboration, following the instructions in <a href="#">Guiso et al. (2008a)</a>						
Hair colour, height, cephalic index	2.35	2.00	1.20	0.00	5.00	450
Hair colour, height	1.56	2.00	0.97	0.00	3.00	450
Own elaboration, allowing for a country to fall into two categories of traits						
Hair colour, height, cephalic index	2.10	2.00	1.13	0.00	4.50	450
Hair colour, height	1.51	1.50	1.03	0.00	3.00	450
<i>Panel C: international migration and destination-to-source trust</i>						
Gross immigration flows (log)	6.84	6.82	1.87	2.08	12.13	463
DtS trust	2.76	2.75	0.30	2.04	3.65	463
Diff. in GDP p.c. (%)	0.38	0.19	0.70	-0.62	3.55	463
Common language	0.09	0.00	0.28	0.00	1.00	463
Weighted distance (log)	6.91	7.01	0.62	5.08	8.13	463
Common border	0.21	0.00	0.40	0.00	1.00	463
Same legal origin	0.33	0.00	0.47	0.00	1.00	463
Migration stock 1960 (log)	5.04	0.00	5.57	0.00	13.50	463
Religious similarity	0.32	0.32	0.24	0.00	0.87	463
<i>Somatic distance</i>						
Available in <a href="#">Guiso et al. (2008a)</a>						
Hair colour, height, cephalic index, skin	2.88	3.00	1.40	0.00	6.00	463
Hair colour, height, skin	2.12	2.00	1.34	0.00	5.00	463
Hair colour, height, cephalic index	2.44	3.00	1.19	0.00	5.00	463
Hair colour, height	1.68	2.00	1.09	0.00	4.00	463
Own elaboration, following the instructions in <a href="#">Guiso et al. (2008a)</a>						
Hair colour, height, cephalic index	2.37	2.00	1.20	0.00	5.00	463
Hair colour, height	1.57	2.00	0.97	0.00	3.00	463
Own elaboration, allowing for a country to fall into two categories of traits						
Hair colour, height, cephalic index	2.11	2.00	1.14	0.00	4.50	463
Hair colour, height	1.52	1.50	1.03	0.00	3.00	463

This table presents the descriptive statistics of the sample used to estimate the effect of DtS trust on commodity export flows (Panel A), the impact of StD trust on gross immigration flows (Panel B), and the effect of DtS trust on gross immigration flows (Panel C). The data sources are described in Sects. 3.1 and 4.1. All samples include observations for European countries over the years for which we have trust data (1970, 1976, 1980, 1983, 1986, 1990, 1991, 1993, 1994, and 1996). The number of observations varies across the panels because of missing data

of the Kleibergen–Paap  $rk$  LM statistic also suggests that the instruments are jointly significant in the first stage of the two-stage least-squares (2SLS) regression.<sup>18</sup> In addition, the Wald statistic based on the Kleibergen–Paap  $rk$  statistic is larger than 10, indicating a sufficiently strong correlation between the instruments and DtS trust

<sup>18</sup> The Kleibergen–Paap  $rk$  LM statistic is the efficient first-stage statistic used to verify the relevance of the instruments when non-i.i.d. disturbances are assumed. Rejection of the null hypothesis suggests that the model is identified, i.e. that the instruments are relevant.

**Table 2** Determinants of international trade—replicating GSZ

	OLS (1)	OLS (2)	OLS (3)	IV-SR (4)	IV-S (5)	RF (6)
DtS trust	0.37* (0.21)	0.29 (0.20)	0.28 (0.20)	1.27*** (0.38)	1.50*** (0.50)	
Common language	0.45** (0.21)	0.26 (0.16)	0.25 (0.17)	0.15 (0.15)	0.17 (0.15)	0.30* (0.16)
Distance btw capitals (log)	-0.05 (0.19)	-0.26 (0.18)	-0.24 (0.18)	-0.32* (0.16)	-0.30* (0.17)	-0.22 (0.17)
Common border	0.49*** (0.14)	0.42*** (0.12)	0.41*** (0.12)	0.37*** (0.12)	0.38*** (0.12)	0.34*** (0.12)
Press coverage	1.37 (1.12)	0.57 (1.11)	0.66 (1.12)	1.57 (0.96)	1.21 (1.05)	0.81 (1.17)
Transportation costs (log)	-4.41** (1.97)	-1.82 (1.90)	-1.82 (1.85)	-0.09 (1.65)	-0.43 (1.72)	-1.43 (1.82)
Same legal origin		0.45*** (0.14)	0.39** (0.15)	0.32** (0.14)	0.38** (0.16)	0.34** (0.15)
Common linguistic roots			0.25 (0.31)	0.17 (0.27)	0.11 (0.29)	0.12 (0.30)
Religious similarity					-0.19 (0.22)	0.05 (0.16)
Somatic distance (GSZ)						-0.09*** (0.03)
<i>Relevance</i>						
K-P rk LM statistic ( <i>p</i> value)				17.91 (0.00)	16.5 (0.00)	
<i>Weak identification</i>						
K-P rk Wald statistic				17.05	26.03	
<i>Over-identification</i>						
Hansen J-statistic ( <i>p</i> value)				0.780 (0.38)		
Observations	679	679	679	679	679	679
R-squared	0.97	0.97	0.98			0.97

The dependent variable is the natural logarithm of aggregated export flows from country  $s$  to country  $d$  (UNComtrade). DtS trust measures the average trust that citizens in importing country  $d$  grant citizens in exporting country  $s$  (Eurobarometer surveys). Somatic distance is the measure used by GSZ that sums the absolute value of the difference in hair colours, heights, and cephalic indices. All equations include country-year dummies. The Kleibergen–Paap rk LM and Wald statistics are the robust statistics in case of non-i.i.d. disturbances. Estimated standard errors reported in parentheses are clustered at the country pair. Coefficients are statistically different from zero at the \*\*\* 1%; \*\* 5%; \* 10% level. Columns (1)–(3) present OLS estimates; columns (4) and (5) present IV estimates with somatic distance and religious similarity as instruments (IV-SR) and with somatic distance as the only instrument (IV-S), respectively. RF refers to the reduced-form of the dependent variable

**Table 3** Trade regression—using a weighted distance indicator

	OLS (1)	OLS (2)	OLS (3)	IV-SR (4)	IV-S (5)	RF (6)
DtS trust	0.27 (0.18)	0.13 (0.17)	0.13 (0.17)	0.85** (0.35)	0.96** (0.47)	
Common language	0.38** (0.16)	0.24** (0.11)	0.25** (0.12)	0.25** (0.10)	0.24** (0.10)	0.30** (0.12)
Weighted distance (log)	−0.88*** (0.25)	−1.03*** (0.22)	−1.04*** (0.23)	−0.94*** (0.24)	−0.91*** (0.25)	−0.99*** (0.23)
Common border	0.29*** (0.11)	0.24** (0.10)	0.24** (0.10)	0.25*** (0.09)	0.26*** (0.10)	0.21** (0.10)
Press coverage	0.13 (1.05)	−1.01 (0.95)	−1.06 (0.96)	−0.34 (0.89)	−0.42 (0.93)	−0.80 (0.98)
Transportation costs (log)	0.42 (1.91)	2.27 (1.66)	2.31 (1.68)	2.48 (1.57)	2.27 (1.68)	2.49 (1.66)
Same legal origin		0.45*** (0.10)	0.47*** (0.13)	0.41*** (0.13)	0.42*** (0.13)	0.42*** (0.13)
Common linguistic roots			−0.07 (0.32)	−0.11 (0.28)	−0.11 (0.28)	−0.15 (0.31)
Religious similarity					−0.06 (0.19)	0.11 (0.14)
Somatic distance (GSZ)						−0.06* (0.03)
<i>Relevance</i>						
K–P rk LM statistic ( <i>p</i> value)				16.95 (0.00)	14.65 (0.00)	
<i>Weak identification</i>						
K–P rk Wald statistic				16.93	22.99	
<i>Over-identification</i>						
Hansen J-statistic ( <i>p</i> value)				0.13 (0.72)		
Observations	679	679	679	679	679	679
<i>R</i> -squared	0.97	0.97	0.98			0.97

See notes for Table 2

so that weak identification problems should not be an issue.<sup>19</sup> Finally, the instruments pass the Hansen J-test intended to verify their exogeneity, that is, that the instruments only affect the dependent variable via the trust channel.

<sup>19</sup> In the presence of i.i.d. disturbances, weak identification problems are detected with the Cragg–Donald F-statistic, which is compared to the critical values published by [Stock and Yogo \(2005\)](#). However, in case of non-i.i.d. disturbances, the Kleibergen–Paap *rk* Wald statistic is the efficient statistic ([Kleibergen and Paap 2006](#); [Kleibergen and Schaffer 2007](#); [Baum et al. 2007](#)). So far, no critical values have been computed for this statistic, and in practice, it is usually compared to the threshold number of 10 recommended by [Staiger and Stock \(1997\)](#); see also [Stock et al. \(2002\)](#). As a robustness test, we compute the limited

The standard statistical tests thus suggest that the IV strategy used by GSZ is valid. Nevertheless, at least religious similarity is suspected to affect international trade through channels other than bilateral trust. This casts doubts on the results presented in column (4) and also on the over-identification test, as the latter is only reliable when the instruments are valid (Murray 2006). Therefore, an alternative specification including religious similarity as a covariate is estimated using an 2SLS approach where the exogenous variation in bilateral trust is captured with a single instrument, the indicator of somatic distance used by GSZ. The results of estimating this specification are presented in column (5). The coefficient on DtS trust increases slightly, and the significance is unchanged compared to column (4).

### 3.3.3 Reduced-form estimates

We further estimate the corresponding reduced-form equation of the dependent variable. This equation is ‘derived by substituting the first-stage equation into the causal relation of interest’ (Angrist and Pischke 2009, p. 121).<sup>20</sup> The first-stage regression is

$$\text{trust}_{dst} = \delta_0 + \delta_1 S_{ds} + \mathbf{X}'_{sd} \eta + \lambda_{st} + \lambda_{dt} + u_{sdt}, \quad (2)$$

where  $S_{ds}$  is the indicator of somatic distance between country  $d$  and country  $s$ , and  $\mathbf{X}'_{sd}$  contains all time-invariant bilateral exogenous covariates, including the proxy for religious similarity. Substituting (2) into (1) and rearranging terms yield

$$\begin{aligned} \log(\text{export}_{sdt}) &= (\beta_0 + \beta_1 \delta_0) + \beta_1 \delta_1 S_{ds} + (\beta_1 \eta + \gamma) \mathbf{X}'_{sd} + (\beta_1 + 1) \lambda_{st} \\ &\quad + (\beta_1 + 1) \lambda_{dt} + (\beta_1 u_{sdt} + \epsilon_{sdt}) \\ &\equiv \tau_0 + \tau_1 S_{ds} + \mathbf{X}'_{sd} \phi + \hat{\lambda}_{st} + \hat{\lambda}_{dt} + v_{sdt}. \end{aligned} \quad (3)$$

$\hat{\lambda}_{st}$  and  $\hat{\lambda}_{dt}$  are time-varying country dummies, and  $v_{sdt}$  is the error term. If the exclusion restriction is satisfied, then, by assumption, all variables in Eq. (3) are orthogonal to the error term  $v_{sdt}$ . This implies that OLS consistently estimates the coefficients and that testing whether  $\tau_1 \equiv \beta_1 \delta_1 = 0$  is an alternative way of testing the hypothesis that  $\beta_1 = 0$  in Eq. (1). As Angrist and Pischke (2009, p. 213) point out, ‘if you can’t see the causal relation of interest in the reduced-form, it’s probably not there’.

Column (6) of Table 3 shows the results of estimating the reduced-form [Eq. (3)]. As expected from the second-stage results, the estimated coefficient on somatic distance

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Footnote 19 continued

information maximum likelihood (LIML) estimates of all our 2SLS regressions and find that the bilateral trust coefficients change only slightly in their size and that the levels of statistical significance are identical to the IV estimates. The results of this sensitivity analysis are available in the online appendix.

<sup>20</sup> See Anderson and Rubin (1949), Dufour (2003), and Chernozhukov and Hansen (2008) for a formal explanation of this alternative test and Angrist and Krueger (1991, 2001) for an application of this method. See also Baum et al. (2007) for an implementation of the Anderson–Rubin test in Stata. This test verifies whether the instruments are significant in the reduced-form equation of the dependent variable.

is significant, though only at the 10% level. Furthermore, religious similarity is not partially correlated with international trade. This result suggests that religious similarity as used by GSZ is not only a potentially invalid but also an irrelevant instrument, in turn biasing the 2SLS coefficient on bilateral trust (e.g. Murray 2006; Angrist and Pischke 2009). This finding supports the choice to estimate alternative specifications that include the proxy for religious similarity at the second stage of the IV approach and to focus most of the discussions on these preferred specifications.

### 3.3.4 (*Lack of*) *robustness*

To examine the robustness of the results reported in Table 3, Eq. (1) is estimated again, keeping the same sample and the same explanatory variables. However, as discussed above, the measure of somatic distance used as instrument for DtS trust varies.

The results of this sensitivity analysis are presented in Table 4, which is divided into four panels.<sup>21</sup> Panel A reports the results of estimating the first-stage regression, and Panel B shows the results of estimating the reduced-form equation (3). The IV coefficients with and without religious similarity as explanatory variable are presented in Panels C and D, respectively. Each panel is composed of eight columns that differ in the indicator of somatic distance employed as instrument for DtS trust. The first four indicators are the ones made available by Guiso et al. (2008a). Column (1) of Panels B, C, and D restates the most important results presented in Table 2 (columns (6), (4), and (5), respectively), where the somatic distance measure actually used in GSZ is employed, that is, the sum of the absolute values of the difference in hair colour, height, and cephalic index (HHC) of two average citizens living in distinct countries. Column (2) is based on a somatic distance measure that additionally considers the differences in skin colour (HHCS). For column (3), the differences in the cephalic index (HHS) are ignored. The measure used for column (4) sums the absolute differences in hair colour and height (HH). For columns (5) and (6), the measures of somatic distance were constructed following the instructions given in Guiso et al. (2008a): first, trying to replicate the measure actually used by GSZ [column (5)]<sup>22</sup>; second, disregarding the potentially problematic cephalic index. Finally, the ones used for the last two columns take the distribution of the population within a country into account, first by accounting for the cephalic index [column (7)] and second by disregarding it [column (8)].

According to Panel A of Table 4, the first-stage OLS coefficients on the instrumental variables are significantly different from zero in every column, and the point estimates are similar across the various somatic distance measures. Panels C and D present the statistics that give indications of the validity of the instruments. According to these statistics, all the instruments are equally relevant, exogenous, and strong. Therefore, one may expect to find similar results in the reduced-form, and in the second stage, no matter which somatic distance measure is used. However, this is not the case. When estimating the reduced-form equation (2), according to Panel B, the only significant

<sup>21</sup> Only the coefficients on DtS trust, somatic distance, and religious similarity are reported. Complete tables including the estimates of the coefficients on the control variables are available in the online appendix.

<sup>22</sup> For several country pairs, we did not manage to do so, which may explain the diverging results.

**Table 4** Trade: instrumenting bilateral trust with various measures of somatic distance

	Guiso et al. (2008a)				Replication		Pop. Density	
	HHC (1)	HH (2)	HHCS (3)	HHS (4)	HHC (5)	HH (6)	HHC (7)	HH (8)
<i>Panel A: first-stage regression</i>								
Dependent variable: destination-to-source trust								
Somatic distance	-0.06*** (0.01)	-0.09*** (0.02)	-0.06*** (0.01)	-0.07*** (0.01)	-0.05*** (0.01)	-0.09*** (0.02)	-0.05*** (0.01)	-0.08*** (0.02)
Religious similarity	0.18*** (0.06)	0.15** (0.06)	0.20*** (0.06)	0.18*** (0.06)	0.17*** (0.07)	0.14** (0.06)	0.15** (0.06)	0.15** (0.06)
<i>Panel B: reduced-form equation of international trade</i>								
Dependent variable: aggregated export flows								
Somatic distance	-0.06* (0.03)	-0.06 (0.05)	-0.02 (0.03)	-0.01 (0.04)	0.01 (0.04)	-0.04 (0.05)	-0.03 (0.03)	-0.06 (0.05)
Religious similarity	0.11 (0.14)	0.09 (0.14)	0.12 (0.14)	0.11 (0.14)	0.12 (0.14)	0.09 (0.15)	0.10 (0.14)	0.09 (0.14)
<i>Panel C: second-stage estimates using somatic distance and religious similarity as instruments</i>								
Dependent variable: aggregated export flows								
DtS trust	0.85** (0.35)	0.69** (0.34)	0.46 (0.31)	0.35 (0.35)	0.20 (0.36)	0.55 (0.36)	0.55 (0.37)	0.69* (0.36)
<i>Relevance</i>								
K-P rk LM statistic	16.95 (0.00)	23.58 (0.00)	19.89 (0.00)	23.33 (0.00)	18.46 (0.00)	20.40 (0.00)	15.27 (0.00)	20.43 (0.00)
<i>Weak identification</i>								
K-P rk Wald statistic	16.93	21.27	19.95	21.30	13.48	21.58	15.74	20.80
<i>Exogeneity</i>								
Hansen J-statistic	0.13 (0.72)	0.02 (0.90)	0.06 (0.80)	0.21 (0.65)	0.58 (0.45)	0.01 (0.91)	0.01 (0.91)	0.02 (0.90)
<i>Panel D: second-stage estimates using somatic distance as instrument</i>								
Dependent variable: aggregated export flows								
DtS trust	0.96** (0.47)	0.74 (0.51)	0.39 (0.44)	0.17 (0.52)	-0.17 (0.57)	0.49 (0.59)	0.50 (0.58)	0.75 (0.58)
<i>Relevance</i>								
K-P rk LM statistic	14.65 (0.00)	20.97 (0.00)	17.65 (0.00)	19.93 (0.00)	11.88 (0.00)	16.72 (0.00)	14.74 (0.00)	18.43 (0.00)

**Table 4** continued

	Guiso et al. (2008a)				Replication		Pop. Density	
	HHC (1)	HH (2)	HHCS (3)	HHS (4)	HHC (5)	HH (6)	HHC (7)	HH (8)
<i>Weak identification</i>								
K–P rk Wald statistic	22.99	28.22	27.99	30.45	15.20	27.60	16.50	24.89
R-squared	0.68	0.70	0.72	0.72	0.72	0.71	0.71	0.70
Observations	679	679	679	679	679	679	679	679

This table presents the coefficients of estimating the first-stage regression (Panel A), the reduced-form equation of the dependent variable (Panel B), the IV coefficients of estimating equation (1) when DtS trust is instrumented with both variables of cultural proximity of country pairs (Panel C), and the IV estimates when instrumenting DtS trust only with a measure of somatic distance (Panel D). In each column, we use an alternative indicator of somatic distance as instrument for bilateral trust. In columns (1)–(4), we use the indicators made available by Guiso et al. (2008a); in columns (5) and (6), the indicators elaborated following the instructions given by them; and in columns (7) and (8), the measures that take the population density into account. The columns are labelled with the letters H, C, and S: H stands for height and hair, C for cephalic index, and S for skin. The coefficients of the control variables (the same as in Table 3) are not reported. Cluster-robust standard errors are reported in parentheses, and the coefficients are statistically different from zero at the \*\*\* 1%; \*\* 5%; \* 10% level

coefficient on somatic distance is found in column (1), where the original indicator of GSZ is used as instrument. Consequently, the only IV coefficients on DtS trust that are significant in Panel D are the ones instrumented with the somatic distance measure employed by GSZ. As soon as alternative measures of somatic distance are employed as instruments [columns (2)–(8)], the significance of the trust coefficients disappears and their magnitude decreases. Column (5) shows the results using the somatic distance measure that was constructed following the instructions of GSZ in the attempt to replicate their results and those in column (1). Although its coefficient is similar to the original indicator at the first stage (compare columns (1) and (5) in Panel A), it enters positively in the reduced-form estimate (Panel B). Moreover, the coefficient on instrumented DtS trust is negative (albeit insignificant) at the second stage (Panel D). This calls for further discussion of the identification strategy and the main results. This additional sensitivity analysis is performed in the next section.

### 3.4 Further sensitivity analysis and discussion

To address the concern that somatic distance might be correlated with cultural and institutional factors that affect international trade (potentially violating the exclusion restriction), dyadic variables were included in the trade regression, and it was verified that the results do not suffer from multicollinearity. For instance, it is controlled for linguistic similarities by including an indicator of common official language and a proxy for common linguistic roots based on the language trees provided by the Ethnologue. However, these measures might not be sufficient to appropriately control for linguistic similarity in the context of trade (Isphording and Otten 2013; Melitz and

Toubal 2014). To address this issue, the measure of common linguistic roots, which was found to be insignificantly related to trade, is replaced by three alternative measures of linguistic similarity suggested by Melitz and Toubal (2014): an indicator of common native language, an indicator of common spoken language, and an indicator of linguistic proximity between different native languages.<sup>23</sup> These language measures are slightly correlated with the somatic distance indicators, but when simultaneously including all four in the trade equation, the reduced-form and IV estimates are almost identical to the ones presented in Table 4, again suggesting that DtS trust does not affect international trade.<sup>24</sup>

Another concern may be that bilateral trust across countries does not affect international trade flows contemporaneously but with a lag. Therefore, the 2SLS procedure is re-estimated by allowing instrumented trust to affect trade flows two years and four years later. The results of these estimations are reported in Panel A and Panel B of Table 5, respectively. Reduced-form estimates and the results in which the various somatic distance indicators are employed as (sole) instruments are again basically unchanged.

Finally, the sample is enlarged by including non-European countries—such as Switzerland—for which data availability is sufficient. Even when sticking to the somatic distance indicator used by GSZ, the coefficient on instrumented DtS trust at the second stage is insignificant, like the OLS estimate (results not reported).

In sum, DtS trust does not remain significant in the trade regression when instrumented with alternative measures of somatic distance that are as equally valid as the one employed by GSZ. According to GSZ (p. 1120), ‘it is possible that—test of overidentifying restrictions notwithstanding—our instruments are not orthogonal to trade, but pick up a set of cultural, institutional, and legal connections that facilitate trade flows. [...] If this is the case, our results suggest the importance of culture-specific factors in trade relationships’. However, according to our reduced-form estimates, neither religious similarity nor the alternative somatic distance indicators considered in addition to the one discussed by GSZ affect trade. In other words, neither bilateral trust nor possible institutional and cultural factors picked up by their instrumentation strategy seem to causally affect trade. This result does not change when additional controls are included in the trade regression or when it is allowed for lags in the trust–trade relationship. Thus, contrary to their conclusion, no robust evidence is found using the approach suggested by GSZ, namely that bilateral trust and/or cultural proximity—apart from common language indicators—causally affect international trade.

#### 4 Bilateral trust and international migration

As stated in the introduction, there are reasons to suspect that bilateral trust affects international migration. StD trust might influence the way expectations about the costs

<sup>23</sup> Melitz and Toubal (2014) emphasise that a measure of common linguistic roots based on the language trees provided by the Ethnologue is problematic, as it does not allow the comparison of languages that belong to different trees.

<sup>24</sup> The regression results and the correlations are reported in the online appendix.

**Table 5** Effects of lagged DtS trust on international trade

	Guiso et al. (2008a)				Replication		Pop. D	
	HHC (1)	HH (2)	HHCS (3)	HHS (4)	HHC (5)	HH (6)	HHC (7)	HH (8)
<i>Panel A: DtS trust lagged two years</i>								
DtS trust	0.79*	0.63	0.25	0.08	-0.35	0.40	0.31	0.60
	(0.45)	(0.51)	(0.44)	(0.53)	(0.58)	(0.60)	(0.58)	(0.59)
<i>Relevance</i>								
K-P rk LM statistic	14.65	20.97	17.65	19.93	11.88	16.72	14.74	18.43
(p value)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
<i>Weak identification</i>								
K-P rk Wald statistic	22.99	28.22	27.99	30.45	15.20	27.60	16.50	24.89
<i>Panel B: DtS trust lagged four years</i>								
DtS trust	0.80*	0.72	0.31	0.21	-0.31	0.58	0.39	0.79
	(0.44)	(0.51)	(0.43)	(0.53)	(0.56)	(0.60)	(0.58)	(0.60)
<i>Relevance</i>								
K-P rk LM statistic	14.65	20.97	17.65	19.93	11.88	16.72	14.74	18.43
(p value)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
<i>Weak identification</i>								
K-P rk Wald statistic	22.99	28.22	27.99	30.45	15.2	27.6	16.5	24.89
Observations	679	679	679	679	679	679	679	679

This table presents the coefficients of regressing international trade on bilateral trust lagged by two years (Panel A) and by four years (Panel B). In each column, alternative indicators of somatic distance are used as instruments for bilateral trust. In columns (1)–(4), the indicators employed are the ones made available by Guiso et al. (2008a), columns (5) and (6) employ indicators elaborated following the instructions given by them, and columns (7) and (8) use the measures that take the population density into account. The columns are labelled with the letters H, C, and S: H stands for height and hair, C for cephalic index, and S for skin. The coefficients of the control variables (the same as in Table 3) are not reported. All estimations include control variables and full sets of source- and country-year fixed effects. Cluster-robust standard errors are reported in parentheses, and the coefficients are statistically different from zero at the \*\*\* 1%; \*\* 5%; \* 10% level

and benefits of moving abroad are shaped while DtS trust may, for example, affect immigration policies in the destination countries. The econometric model used is similar to (1), with migration flows rather than trade flows as the dependent variable, but less standard. Therefore, the estimated equation is derived in a structural way by presenting a Roy model that heavily draws on recent contributions by Ortega and Peri (2013) and Bertoli and Moraga (2013).

#### 4.1 Structural model and data

Consider an individual  $i$  born in country  $s$ . Suppose that the utility from staying in  $s$ , denoted by  $U_{ss}^i$ , and moving to country  $d \neq s$ ,  $U_{sd}^i$ , can be additively decomposed into a component that is common for all individuals in country  $s$  ( $V_{ss}$ ,  $V_{sd}$ ), and a component that is location- and individual-specific ( $\theta_{ss}^i$ ,  $\theta_{sd}^i$ ):

$$U_{sj}^i = V_{sj} + \theta_{sj}^i, \quad j \in \{d, s\}. \tag{4}$$

Suppose that we do not observe the individual-specific components but know that  $\theta_{ss}^i$  and  $\theta_{sd}^i$ ,  $d \neq s$ , are all identically and independently type-I extreme value distributed with no correlation between  $\theta_{ss}^i$  and  $\theta_{sd}^i$ ,  $d \neq s$ , but correlation among the terms  $\theta_{sd}^i$ ,  $d \neq s$ . Allowing for correlation among the individual-specific terms of all potential destination countries accounts for unobserved individual heterogeneity which captures that migrants could be a selected group and have correlated utility within destination countries. It relaxes the assumption of independence of irrelevant alternatives previously applied in the migration literature (e.g. [Beine et al. 2011](#); [Grogger and Hanson 2011](#)). In the language of a nested logit model ([McFadden 1978](#)), all destination countries are assumed to belong to the same nest.<sup>25</sup> Considering the now standard generalised extreme value generating function ([McFadden 1978](#)), the probability of observing that an individual  $i$  born in country  $s$  does not migrate can be written as

$$p_s = \frac{e^{V_{ss}}}{e^{V_{ss}} + \left(\sum_{d \neq s} e^{V_{sd}/\tau}\right)^\tau}, \tag{5}$$

where  $1 - \tau$  captures the correlation among the terms  $\theta_{sd}^i$ ,  $d \neq s$ . The probability of migrating to  $d \neq s$  reads as

$$p_d = \frac{e^{V_{sd}/\tau} \left(\sum_{d \neq s} e^{V_{sd}/\tau}\right)^{\tau-1}}{e^{V_{ss}} + \left(\sum_{d \neq s} e^{V_{sd}/\tau}\right)^\tau}. \tag{6}$$

Thus, the log of the relative probability of staying and migrating is given by

$$\log\left(\frac{p_s}{p_d}\right) = V_{ss} - \frac{V_{sd}}{\tau} + z_s, \tag{7}$$

where  $z_s \equiv (1 - \tau) \log(\sum_{d \neq s} e^{V_{sd}/\tau})$ . Let us approximate  $p_s/p_d$  by the observed number of stayers in  $s$ ,  $n_s$ , relative to the number (flow) of migrants to  $d \neq s$ ,  $\text{mig}_{sd}$ , that is,  $p_s/p_d \approx n_s/\text{mig}_{sd}$ . Taking logs, we obtain

$$\log\left(\frac{p_s}{p_d}\right) = \log(n_s) - \log(\text{mig}_{sd}) + \epsilon_{sd}, \quad d \neq s, \tag{8}$$

where term  $\epsilon_{sd}$  captures the error of approximating probabilities ([Ortega and Peri 2013](#)). Combining the right-hand sides of (7) and (8) and adding time index  $t$  imply

$$\log(\text{mig}_{sdt}) = \frac{V_{sdt}}{\tau} + \lambda_{st} + \epsilon_{sdt}, \tag{9}$$

<sup>25</sup> This is a special case of [Bertoli and Moraga \(2013\)](#) that was proposed by [Ortega and Peri \(2013\)](#).

where  $\lambda_{st} \equiv \log(n_{st}) - V_{sst} - z_{st}$  is captured with time-dependent source-country dummies. Let the observable utility component  $V_{sdt}$  of a migrant moving from  $s$  to  $d$  in period  $t$  additively depend on bilateral (StD or DtS) trust, the difference in the log of per capita income across countries, time-invariant differences between  $s$  and  $d$ , and time-varying characteristics of the destination country captured by a time-dependent destination country fixed effect.<sup>26</sup> Indicators of StD trust and DtS trust cannot be simultaneously included in the estimated equation because they turn out being highly correlated. These theoretical considerations then suggest the following two specifications:

$$\log(\text{mig}_{sdt}) = \alpha_0 + \alpha_1 \text{trust}_{sdt} + \alpha_2 \Delta GDP_{sdt} + \mathbf{X}'_{sd} \gamma + \lambda_{dt} + \lambda_{st} + \epsilon_{sdt}, \quad (10)$$

$$\log(\text{mig}_{sdt}) = \beta_0 + \beta_1 \text{trust}_{dst} + \beta_2 \Delta GDP_{sdt} + \mathbf{X}'_{sd} \rho + \lambda_{dt} + \lambda_{st} + e_{sdt}, \quad (11)$$

where the dependent variable, denoted by  $\log(\text{mig}_{sdt})$ , is the natural logarithm of the (gross) immigration flows from country-of-origin  $s$  to country-of-destination  $d$  in period  $t$ ,  $\text{trust}_{sdt}$  and  $\text{trust}_{dst}$  stand for the StD and DtS trust observed in year  $t$ , respectively, and  $\Delta GDP_{sdt}$  measures the percentage difference in the gross domestic product (GDP) per capita of the two countries. This variable is used as a proxy for the wage differential between a country pair suspected to affect international labour migration.  $\mathbf{X}'_{sd}$  is a vector of bilateral time-invariant variables,  $\lambda_{st}$  and  $\lambda_{dt}$  are country-year fixed effects, and  $\epsilon_{sdt}$  and  $e_{sdt}$  are mean-zero random variables.

To estimate these specifications, we use data on immigration flows collected by [Ortega and Peri \(2009, 2011\)](#) for the dependent variable. They merged and harmonised data sets gathered by [Mayda \(2010\)](#), the United Nations and the OECD (International Migration Database) to establish an unbalanced panel of annual data on bilateral gross immigration flows into 30 OECD countries from 1946 to 2008. This unique data set details the legal entry of foreign citizens who wish to be residents in an OECD country. Consistency is ensured by verifying that immigrants are always defined on the same basis across the database for each destination country.<sup>27</sup> The other variables are identical to the ones used in Tables 3 and 4. Regarding geographical distance, only the measure provided by [Mayer and Zignago \(2011\)](#) is employed.

## 4.2 Results

Panel B of Table 1 reports the summary statistics of the sample used to analyse the relationship between international migration and StD trust, and Panel C those used to analyse the effect of international migration on DtS trust. The number of observations varies across panels because of missing data. The analysis again focuses on

<sup>26</sup> [Ortega and Peri \(2013\)](#) do not allow for destination country fixed effects to vary over time.

<sup>27</sup> To complete the data set, [Ortega and Peri \(2009, 2011\)](#) interpolate observations when the missing value is situated between two years for which the observations are available and compute the net immigration flows. They correct for the outflow of foreign citizens using the International Migration Database and the data set on emigration stocks for the years 1990 and 2000 collected by [Docquier et al. \(2007\)](#). However, these net immigration flows are less precise than the gross flows and only have a limited coverage.

observations for European countries in the years for which data on bilateral trust are available.

#### 4.2.1 Basic estimates

The results of estimating equations (10) and (11) are shown in Tables 6 and 7, respectively. The first three columns present standard OLS estimates. They suggest that a 1 % increase in the difference in GDP per capita increases immigration flows on average by approximately 2 %. This positive and significant effect is in line with the notion, typically supported by the data, that international wage differentials affect migration patterns. Moreover, geographical distance between countries has a significant and negative effect on the dependent variables, while sharing legal origins has a positive effect.

The main finding from columns (1)–(3) is the absence of a significant correlation between bilateral trust and immigration flows. In column (1) of Table 6, the coefficient on StD trust is positive but rather small and not significantly different from zero. In column (2), an indicator of the existing diaspora in the destination countries is included. [Beine et al. \(2011\)](#) showed that an increase in the past stock of migrants in a country increases migration flows, possibly because a larger diaspora reduces the costs and risks migrants face when moving abroad. Such network effects are captured with a proxy for the emigration stocks in 1960, as employed in [Grossmann and Stadelmann \(2013\)](#). This variable ensures a lag of at least 10 years that exists between the proxy and the other observations included in our regression. It is itself significant and positive, as found in previous studies. Adding it decreases the coefficient of StD trust, which is still statistically insignificant. The same pattern is observed when including religious similarity as control variable in column (3): it halves the coefficient of StD trust and slightly increases its standard error. The OLS estimates thus suggest that StD trust is not significantly related to international migration.

Next, again, the IV estimation proposed by GSZ is applied, and a sensitivity analysis is performed to examine whether the IV results follow a similar pattern in the migration setting as they did in the trade setting. Using the somatic distance measure as employed by GSZ and religious similarity as instruments, the coefficient on StD trust strongly increases compared to the OLS estimates and becomes significantly different from zero at the 5 % level [column (4)]. The employed instruments pass the Hansen J-test. The Kleibergen–Paap *rk* statistics suggest that they are relevant and strong. Nevertheless, like for Table 3, there are several reasons to regard the results in column (4) with caution. First, the IV estimate on StD trust is five times larger than the OLS counterpart. This suggests that an increase in StD trust of one standard deviation increases gross immigration flows on average by 66 %, which is a surprisingly large effect in view of the OLS estimate. Second, there is again plenty of reason to believe that religious similarity may affect international migration not exclusively through the trust channel. It rather may shape institutional differences related to international labour mobility or be affected by migration flows themselves, as these potentially change the composition of the population in many respects. Finally, the previous section suggests that the coefficient on bilateral trust might not be robust to the use of alternative measures of somatic distance as instruments.

**Table 6** Bilateral migration flows and StD trust

	OLS (1)	OLS (2)	OLS (3)	IV-SR (4)	IV-S (5)	RF (6)
Trust (StD)	0.68 (0.59)	0.43 (0.60)	0.23 (0.65)	2.22** (0.93)	2.40 (1.51)	
Diff. in GDP p.c. (%)	1.66* (0.86)	2.07** (0.87)	1.93** (0.84)	2.50** (0.96)	2.55** (1.02)	2.01** (0.84)
Common language	-0.24 (0.34)	-0.36 (0.33)	-0.27 (0.33)	-0.41 (0.28)	-0.42 (0.29)	-0.25 (0.35)
Weighted distance (log)	-0.70** (0.31)	-0.57* (0.30)	-0.55* (0.30)	-0.41 (0.27)	-0.41 (0.29)	-0.47 (0.30)
Common border	0.00 (0.34)	0.26 (0.38)	0.21 (0.38)	0.30 (0.30)	0.30 (0.29)	0.23 (0.37)
Same legal origin	0.61*** (0.24)	0.69*** (0.23)	0.52* (0.27)	0.54*** (0.20)	0.56** (0.22)	0.53** (0.26)
Mig. Stock 1960 (log)		0.33* (0.18)	0.30* (0.17)	0.24 (0.15)	0.23 (0.16)	0.32* (0.17)
Religious similarity			0.50 (0.46)		-0.08 (0.56)	0.43 (0.39)
Somatic distance (GSZ)						-0.09 (0.07)
<i>Relevance</i>						
K-P rk LM statistic ( <i>p</i> value)				21.61 (0.00)	13.99 (0.00)	
<i>Weak identification</i>						
K-P rk Wald statistic				14.41	12.37	
<i>Over-identification</i>						
Hansen J-statistic ( <i>p</i> value)				0.02 (0.88)		
Observations	450	450	450	450	450	450
R-squared	0.89	0.89	0.89			0.89

The dependent variable is the natural logarithm of migration flows from country *s* to country *d* (Ortega and Peri 2009, 2011). Trust (StD) measures the average trust that citizens in country *s* grant citizens in country *d* (Eurobarometer surveys). Somatic distance is the measure used by GSZ that sums the absolute value of the difference in hair colour, height, and cephalic index. All equations include country-year dummies. The estimated robust standard errors reported in parentheses are clustered at the country pair. Coefficients are statistically different from zero at the \*\*\* 1%; \*\* 5%; \* 10% level. Columns (1)–(3) present OLS estimates; columns (4) and (5) present IV estimates with somatic distance and religious similarity as instruments (IV-SR) and with somatic distance as the only instrument (IV-S), respectively. RF [column (6)] refers to the reduced-form equation of the dependent variables

To address these concerns, an alternative specification that does not exclude the proxy for religious similarity as an explanatory variable in the migration equation is estimated. Column (5) reports the results when the sole indicator of somatic distance employed as instrumental variable for bilateral trust is the one used by GSZ. The

IV coefficient on StD trust is similar in magnitude to that in column (4), but it loses its significance. Column (6) shows the results of estimating a reduced-form equation analogously to Eq. (3). The results suggest that neither somatic distance nor religious similarity are partially correlated with international migration in the reduced form. This absence of a correlation between the instrumental variables and the dependent variable, as well as the insignificant coefficients found in columns (1)–(3), raises doubts about the hypothesis that StD trust affects the decision of potential migrants to move abroad.

According to Table 7, the relationship between DtS trust and international migration is similar to the one observed in Table 6 between StD trust and international migration. In columns (1)–(3), the OLS estimates of the coefficient of DtS trust are positive but not statistically significant. Instrumenting DtS trust with indicators of religious similarity and somatic distance in column (4) yields significant results, here at the 10% level, that are more than five times larger than their OLS counterparts. They suggest that an increase in DtS trust of one standard deviation increases immigration flows on average by 56%. However, according to column (5), when including religious similarity at the second stage rather than using it as an instrument for DtS trust, the coefficient on DtS trust becomes insignificant. Moreover, also similar to Table 6, column (6) in Table 7 shows that the correlation between the instruments and international migration is again insignificant when estimated in the reduced form.

#### 4.2.2 (Lack of) robustness

In view of these inconclusive results with respect to the relationship between bilateral trust and international migration, we again exploit the fact that there is a large degree of freedom in defining the concept of somatic distance and estimate regressions (10) and (11) with the same covariates and the same sample again, changing only the somatic distance indicator used as the instrument. The results of this analysis are reported in Table 8 for the relationship between international migration and StD trust and in Table 9 for its relationship with DtS trust.

In column (1) of Panels B, C, and D of Table 8, the most important results of Panel A in Table 6 are restated (columns (6), (4), and (5), respectively). Panel A of Table 8 additionally reports the first-stage coefficients on somatic distance and religious similarity when StD trust is regressed on all included and excluded exogenous variables. As in the case where international trade flows are the dependent variable at the second stage, various measures of somatic distance are equally significant at the first stage, and the coefficients are similar across the different columns. However, none of these indicators are correlated with international migration in the reduced-form equation (Panel B).

Panel C shows the second-stage results for the case where the eight measures of somatic distance are used as instruments jointly with religious similarity. Whereas second-stage estimates for the coefficients on StD trust are significant in columns (1), (2), (7), and (8), they are insignificant in the other columns. Given the particularly questionable validity of religious similarity as instrumental variable for bilateral trust, Panel D reports the trust coefficients when instrumenting StD trust solely with the measures of somatic distance (again not excluding religious similarity in the second-

**Table 7** Bilateral migration flows and DtS trust

	OLS (1)	OLS (2)	OLS (3)	IV-SR (4)	IV-S (5)	RF (6)
Trust (DtS)	0.62 (0.57)	0.33 (0.60)	0.22 (0.62)	1.78* (0.99)	1.53 (1.02)	
Diff. in GDP p.c. (%)	1.64* (0.84)	2.05** (0.84)	1.97** (0.82)	2.01** (0.78)	2.05*** (0.76)	2.10** (0.81)
Common language	-0.15 (0.35)	-0.30 (0.34)	-0.22 (0.34)	-0.18 (0.29)	-0.19 (0.29)	-0.22 (0.36)
Weighted distance (log)	-0.73** (0.31)	-0.61** (0.30)	-0.58* (0.29)	-0.51* (0.27)	-0.52** (0.26)	-0.50 (0.31)
Common border	-0.04 (0.33)	0.23 (0.39)	0.19 (0.39)	0.15 (0.28)	0.14 (0.29)	0.22 (0.37)
Same legal origin	0.57** (0.25)	0.65*** (0.23)	0.49* (0.27)	0.51** (0.21)	0.47** (0.22)	0.51* (0.26)
Mig. Stock 1960 (log)		0.31* (0.17)	0.28 (0.18)	0.18 (0.16)	0.20 (0.16)	0.30* (0.17)
Religious similarity			0.46 (0.39)		0.25 (0.33)	0.36 (0.39)
Somatic distance (GSZ)						-0.08 (0.06)
<i>Relevance</i>						
K-P rk LM statistic ( <i>p</i> value)				13.93 (0.00)	11.09 (0.00)	
<i>Weak identification</i>						
K-P rk Wald statistic				15.05	20.49	
<i>Over-identification</i>						
Hansen J-statistic ( <i>p</i> value)				0.60 (0.44)		
Observations	463	463	463	463	463	463
R-squared	0.89	0.89	0.89			0.90

The dependent variable is the natural logarithm of the migration flows from country *s* to country *d* (Ortega and Peri 2009, 2011). Trust (DtS) measures the average trust that citizens in country *d* grant citizens in country *s* (Eurobarometer surveys). Somatic distance is the measure used by GSZ that sums the absolute value of the differences in hair colour, height, and cephalic index. All equations include country-year dummies. Robust standard errors are reported in parentheses, which are clustered at the country pair. Coefficients are statistically different from zero at the \*\*\* 1%; \*\* 5%; \* 10% level. Columns (1)–(3) present OLS estimates; columns (4) and (5) present IV estimates with somatic distance and religious similarity as instruments (IV-SR) and with somatic distance as the only instrument (IV-S), respectively. RF [column (6)] refers to the reduced-form equation of the dependent variables

stage estimates). Consistent with the results found in Panel B, none of the estimations yield statistically significant coefficients, and some even have a negative sign.

Regarding the effect of DtS trust on migration, Table 9 provides a sensitivity analysis of the results presented in Table 7. Column (1) of Panels B, C, and D of Table 9

**Table 8** Migration: instrumenting StD trust with various measures of somatic distance

	Guiso et al. (2008a)				Replication		Pop. Density	
	HHC (1)	HH (2)	HHCS (3)	HHS (4)	HHC (5)	HH (6)	HHC (7)	HH (8)
<i>Panel A: first-stage regression</i>								
Dependent variable: source-to-destination trust								
Somatic distance	-0.04*** (0.01)	-0.06*** (0.01)	-0.04*** (0.01)	-0.05*** (0.01)	-0.03** (0.01)	-0.06*** (0.01)	-0.04*** (0.01)	-0.06*** (0.01)
Religious similarity	0.21*** (0.07)	0.18*** (0.06)	0.21*** (0.07)	0.18*** (0.06)	0.21*** (0.08)	0.16** (0.07)	0.20*** (0.07)	0.17** (0.07)
<i>Panel B: Reduced-form equation of international migration</i>								
Dependent variable: international immigration flows								
Somatic distance	-0.09 (0.07)	-0.09 (0.08)	0.01 (0.06)	0.03 (0.08)	0.01 (0.07)	-0.02 (0.10)	-0.08 (0.07)	-0.07 (0.09)
Religious similarity	0.43 (0.39)	0.41 (0.40)	0.58 (0.43)	0.60 (0.45)	0.58 (0.45)	0.53 (0.46)	0.42 (0.40)	0.44 (0.41)
<i>Panel C: Second-stage estimates using somatic distance and religious similarity as instruments</i>								
Dependent variable: international immigration flows								
StD trust	2.22** (0.93)	1.84** (0.80)	0.95 (0.83)	0.83 (0.79)	1.27 (0.85)	1.25 (0.81)	2.00** (0.89)	1.71* (0.82)
<i>Relevance</i>								
K-P rk LM statistic	21.61 (0.00)	25.88 (0.00)	24.39 (0.00)	26.94 (0.00)	21.68 (0.00)	24.99 (0.00)	20.80 (0.00)	24.69 (0.00)
<i>Weak identification</i>								
K-P rk Wald statistic	14.41	16.10	18.64	19.19	12.54	17.59	14.74	17.68
<i>Exogeneity</i>								
Hansen J-statistic	0.02 (0.88)	0.07 (0.80)	1.79 (0.18)	2.12 (0.15)	0.90 (0.34)	0.90 (0.34)	0.01 (0.93)	0.17 (0.68)
<i>Panel D: Second-stage estimates using somatic distance as instrument</i>								
Dependent variable: International immigration flows								
StD trust	2.40 (1.51)	1.60 (1.23)	-0.33 (1.30)	-0.47 (1.23)	-0.36 (1.79)	0.24 (1.36)	1.89 (1.50)	1.28 (1.33)
<i>Relevance</i>								
K-P rk LM statistic	13.99 (0.00)	22.52 (0.00)	20.47 (0.00)	23.71 (0.00)	8.23 (0.00)	17.72 (0.00)	17.50 (0.00)	19.50 (0.00)

**Table 8** continued

	Guiso et al. (2008a)				Replication		Pop. Density	
	HHC (1)	HH (2)	HHCS (3)	HHS (4)	HHC (5)	HH (6)	HHC (7)	HH (8)
<i>Weak identification</i>								
K–P rk Wald statistic	12.37	18.11	19.65	23.80	5.54	18.62	12.85	19.30
Observations	450	450	450	450	450	450	450	450

This table presents the coefficients of estimating the first-stage regression (Panel A), the reduced-form equation of the dependent variable (Panel B), the IV coefficients of estimating equation 10 when StD trust is instrumented with both variables of cultural proximity of country pairs (Panel C), and the IV estimates when instrumenting StD trust only with a measure of somatic distance (Panel D). In each column, alternative indicators of somatic distance are used as instruments for bilateral trust. In columns (1)–(4), the employed indicators are the ones made available by GSZ; in columns (5) and (6), the indicators are elaborated following the instructions given by Guiso et al. (2008a); and in columns (7) and (8), the measures take the population density into account. The columns are labelled with the letters H, C, and S: H stands for height and hair, C for cephalic index, and S for skin. The coefficients of the control variables (the same as in Table 6) are not reported. Cluster-robust standard errors are reported in parentheses, and the coefficients are statistically different from zero at the \*\*\* 1%; \*\* 5%; \* 10% level

restates the most important results. According to Panel A of Table 9, all indicators of somatic distance significantly affect DtS trust at the 5% level. However, again, none of them are correlated with international migration in the reduced-form equation (Panel B). Panel C reports the IV estimates when using somatic distance and religious similarity as instruments for DtS trust. Analogously to the results found in Panel C of Table 8, the statistical tests suggest that the instruments are relevant and exogenous. Moreover, the coefficients on instrumented DtS trust are sometimes significant at the second stage. However, according to Panel A, as repeatedly mentioned, the indicator of religious similarity is not significantly correlated with DtS trust and is thus a potentially problematic instrument. Panel D of Table 9 shows the second-stage estimates when instrumenting DtS trust with the various measures of somatic distance as sole instruments. Consistent with the reduced-form results in Panel B, the coefficients on instrumented DtS trust are all statistically insignificant and, analogously to Panel D of Table 8, sometimes even negative.

#### 4.2.3 Discussion of results

Overall, the results in Tables 6, 7, 8, and 9 suggest that neither StD nor DtS trust play a robust role in international migration flows. In particular, all measures of somatic distance are irrelevant in the reduced-form estimates, and the instrumented trust measures are insignificant if religious similarity is not excluded at the second stage. Thus, analogously to international trade, there is no convincing evidence that bilateral trust and/or cultural proximity as measured by religious similarity and somatic distance are important determinants of international migration.

**Table 9** Migration: instrumenting DtS trust with various measures of somatic distance

	Guiso et al. (2008a)				Replication		Pop. Density	
	HHC (1)	HH (2)	HHCS (3)	HHS (4)	HHC (5)	HH (6)	HHC (7)	HH (8)
<i>Panel A: first-stage regression</i>								
Dependent variable: destination-to-source trust								
Somatic distance	-0.06*** (0.01)	-0.06*** (0.01)	-0.05*** (0.01)	-0.05*** (0.01)	-0.05*** (0.01)	-0.06*** (0.02)	-0.06*** (0.01)	-0.05*** (0.01)
Religious similarity	0.07 (0.07)	0.06 (0.07)	0.08 (0.07)	0.07 (0.07)	0.08 (0.08)	0.06 (0.08)	0.06 (0.07)	0.06 (0.07)
<i>Panel B: reduced-form equation of international migration</i>								
Dependent variable: international immigration flows								
Somatic distance	-0.08 (0.06)	-0.08 (0.08)	0.02 (0.06)	0.03 (0.08)	0.01 (0.07)	-0.00 (0.10)	-0.08 (0.07)	-0.06 (0.08)
Religious similarity	0.36 (0.39)	0.36 (0.40)	0.52 (0.42)	0.55 (0.44)	0.51 (0.45)	0.49 (0.46)	0.35 (0.39)	0.39 (0.41)
<i>Panel C: second-stage estimates using somatic distance and religious similarity as instruments</i>								
Dependent variable: international immigration flows								
DtS trust	1.78* (0.99)	1.77* (1.06)	0.29 (0.89)	0.39 (1.02)	0.77 (0.98)	1.13 (1.19)	1.64* (1.00)	1.63 (1.17)
<i>Relevance</i>								
K-P rk LM statistic	13.93 (0.00)	15.21 (0.00)	13.88 (0.00)	14.52 (0.00)	13.15 (0.00)	11.70 (0.00)	15.97 (0.00)	13.97 (0.00)
<i>Weak identification</i>								
K-P rk Wald statistic	15.05	11.37	14.19	10.10	13.23	8.62	14.73	10.10
<i>Exogeneity</i>								
Hansen J-statistic	0.60 (0.44)	0.65 (0.42)	2.50 (0.11)	2.48 (0.12)	1.88 (0.17)	1.59 (0.21)	0.74 (0.39)	0.88 (0.35)
<i>Panel D: second-stage estimates using somatic distance as instrument</i>								
Dependent variable: international immigration flows								
DtS trust	1.53 (1.02)	1.39 (1.16)	-0.37 (1.03)	-0.65 (1.29)	-0.29 (1.29)	0.05 (1.52)	1.40 (1.05)	1.06 (1.33)
<i>Relevance</i>								
K-P rk LM statistic	11.09 (0.00)	13.19 (0.00)	11.82 (0.00)	13.10 (0.00)	7.83 (0.01)	8.44 (0.00)	12.79 (0.00)	10.71 (0.00)

**Table 9** continued

	Guiso et al. (2008a)				Replication		Pop. Density	
	HHC (1)	HH (2)	HHCS (3)	HHS (4)	HHC (5)	HH (6)	HHC (7)	HH (8)
<i>Weak identification</i>								
K–P rk Wald statistic	20.49	17.22	22.35	16.22	14.61	10.73	23.49	14.29
Observations	463	463	463	463	463	463	463	463

This table presents the coefficients of estimating the first-stage regression (Panel A), the reduced-form equation of the dependent variable (Panel B), the IV coefficients of estimating equation 11 when DtS trust is instrumented with both variables of cultural proximity of country pairs (Panel C), and the IV estimates when instrumenting DtS trust only with a measure of somatic distance (Panel D). In each column, an alternative indicator of somatic distance is used as instrument for bilateral trust. In columns (1)–(4), the indicators employed are the one made available by GSZ; in columns (5) and (6), the indicators are elaborated following the instructions given by Guiso et al. (2008a); and in columns (7) and (8), the measures take the population density into account. The columns are labelled with the letters H, C, and S where H stands for height and hair, C for cephalic index, and S for skin. The coefficients of the control variables (the same as in Table 7) are not reported. Cluster-robust standard errors are reported in parentheses, and the coefficients are statistically different from zero at the \*\*\* 1%; \*\* 5%; \* 10% level

## 5 Conclusion

This article has examined the causal impact of average bilateral trust across countries on bilateral international trade and migration flows. We first followed the identification strategy of GSZ by using religious similarity and somatic distance between country pairs as instrumental variables for bilateral trust to capture the exogenous variation in the trust measure. We added a sensitivity analysis to GSZ when investigating the determinants of international trade and, for the first time, investigated the role of cultural proximity apart from common language measures in the context of international migration. We constructed and employed as instruments for bilateral trust seven different indicators of somatic distance (based on different weighting of physical attributes) in addition to the one by GSZ. Our alternative somatic distance indicators appear equally valid and strong at the first stage of the 2SLS estimates. By contrast to GSZ, we focussed on an IV strategy where religious similarity is not excluded at the second stage. We find that instrumented DtS trust has a significant effect in the trade regression only if employing the somatic distance indicator used in GSZ. In the migration regression, neither coefficients of StD trust nor DtS trust are ever significant. Moreover, we examined reduced-form estimates in which trade and migration are regressed on all explanatory variables as well as on somatic distance and religious similarity. Reduced-form estimates of coefficients on religious similarity and the somatic distance indicators are insignificantly different from zero except in the context of trade when we use the somatic distance indicator by GSZ. In sum, whereas GSZ concluded that their ‘results suggest that cultural relationships affect trust and are an important omitted factor in international trade’ (p. 1098), we found no robust evidence for the hypotheses that bilateral trust across countries and/or cultural proximity apart from language affects international trade or migration patterns.

Of course, it is possible that the measure of average trust which citizens from one country have towards those from another country, as elicited from the employed Eurobarometer surveys, is not an appropriate measure of bilateral trust in the context of trade and migration. Moreover, we do not satisfactorily solve the potential validity problems of the employed instruments. Future research shall thus attempt to develop and apply alternative identification strategies to GSZ. A fruitful guidance is the quasi-experimental approach in [Egger and Lassmann \(2013\)](#), which employs data from the trade of language regions in Switzerland with neighbouring countries, to deal better with within-country heterogeneity and to draw inference on causal effects more convincingly.

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