How Do Cultural Factors Affect Agricultural Trade？

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Abstract

The purpose of this paper is to investigate the ways in which cultural factors such as language, region and colonial ties affect trade in agricultural products, as compared with trade in manufactured goods. Using the augmented gravity model, we find that commonality of language, religion and a colonial relationship between trading countries enhance trade in agricultural products more significantly than trade in manufactured goods. This result implies that trade in agricultural products depends more heavily on cultural ties between the trading partners than trade in manufactured goods. This greater effect of cultural ties on agricultural trade remains, even upon analyzing differentiated agricultural products and manufactured goods.

Keywords: culture; gravity model; agricultural trade
JEL Classification: N50; Q10; Q17

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1. Introduction

Customer tastes or preferences in the sector of agricultural products generally diverge to a far greater extent than is the case for manufactured goods. This means that it is significantly more difficult to formulate a common international global food standard than to prepare ISO standards for manufactured goods. Whilst high-quality manufactured goods are in almost all cases acceptable throughout the world, it cannot be said that all categories of agricultural products that originate from fertile farmland and are converted to marketable condition by application of carefully controlled procedures will be acceptable to all customers. By way of example, in some regions of the world people will never eat specific types of food for reasons connected with the particular local religion. Thus, the locally preferred types and quality of agricultural products depend heavily on the local environment and food culture.

Cultural differences lead to divergence of tastes and preferences, and this situation may have the effect of discouraging trade. The role of cultural factors, such as language, religion, and colonial history in influencing merchandise trade has been under investigation for a great length of time. A large number of published papers include reports of empirical investigations into the effect of cultural ties on trade in manufactured goods in particular. Scholars have performed econometric studies on the role of cultural ties in trade by introducing dummy variables into a gravity equation, and this technique has proved to be a very successful tool for explaining the volume of bilateral trade under variable conditions (see, for example, Havrylyshyn and Pritchett, 1991; Foroutan and Pritchett, 1993; Boisso and Ferrantino, 1997; Guo, 2004; Noland, 2005). In these studies, a positive relationship has been consistently found between cultural ties and merchandise trade.

The purpose of this paper is to empirically investigate the question of whether trade in agricultural products depends more heavily on cultural ties between trading partners than is the case for trade in manufactured goods. In general, differences in tastes or preferences for products between trading countries strongly discourage international trade between those countries. Therefore, due to the more divergent tastes for agricultural products, similarity of taste would be expected to have a far greater effect on volume of trade in agricultural products than on that in manufactured goods. As a result, since closer cultural ties between countries lead to greater similarity of taste between those countries, cultural ties affect trade in agricultural products far more strongly than trade in manufactured goods.

Indeed, we can find evidence of larger volumes of trade between countries with closer cultural ties. In 1999, European Union countries imported nearly 99.83% of total Moroccan potato exports. In particular, France, which was once a colonizer of Morocco, is by far the largest importer of Moroccan potatoes (World Potato Congress[1]). Argentina is the second largest exporter of corn in the world and exports a large proportion of the corn to Portugal and Spain, which colonized Argentina from the sixteenth century to the nineteenth century (The World of Corn[2]). Also, in the opposite direction, Algeria imports a major proportion of its sugar from its former colonizer, France (UN Comtrade). It can certainly be said that this evidence indicates a close relationship between trade in agricultural products and colonial ties.

Using the trade data for 118 countries, we estimate augmented gravity equations for trade in agricultural products and manufactured goods separately. Then, we test whether the estimated coefficients for cultural variables differ between agricultural and manufacturing trade. On applying this procedure, we find that commonality of language, religion and a colonial relationship enhance agricultural trade more than manufacturing trade. Based on Rauch (1999)'s classification, the gravity equation is also regressed for trade in differentiated agricultural products and manufactured goods. Our finding is that, even in differentiated products, agricultural trade is more sensitive to cultural ties than manufacturing trade.

The remainder of this paper is organized as follows. Section 2 sets out our gravity model and methodology for empirical analysis. In Section 3 we outline data issues. In Section 4 we set out our empirical results, and Section 5 examines trade in differentiated products. Section 6 contains our concluding remarks.

2. The Gravity Equation and the Data

In this section we provide a gravity equation to be employed in regression analysis. It is well known that a gravity equation can be supported by various kinds of theoretical trade model. A standard gravity equation takes the following form:

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[1] http://www.potatocongress.org
[2] http://www.ncga.com/WorldOfCorn/main/index.htm

$$\ln T_{ij} = \alpha_0 + \alpha_1 \ln GDP_i + \alpha_2 \ln GDP_j + \alpha_3 \ln Distance_{ij} + \varepsilon_{ij}\,.$$

T_{ij} denotes import values of country i from country j, GDP_i denotes Gross Domestic Product of country i, $Distance_{ij}$ is the geographical distance between countries i and j, and ε_{ij} is a disturbance term. In the equation above, we include variables such as a relative distance measure, GDP per capita, land area, a dummy variable to capture the country pairs sharing a land border, and dummy variables for countries surrounded by land or sea. Included also are a dummy variable for WTO member countries and a dummy variable for country pairs belonging to a common regional trade arrangement.

In addition, we introduce three kinds of variable to capture the effect of cultural ties. First, in order to examine effect of linguistic similarity on trade, we introduce a linguistic dummy variable, *Language*, that takes one if two countries share a common official language and zero otherwise. Since Havrylyshyn and Pritchett (1991) and Foroutan and Pritchett (1993), a language dummy variable, which equals one if countries share a language, has been widely used as a proxy for linguistic similarity. Helliwell (1999) makes a comprehensive survey of earlier findings and concludes that bilateral merchandise trade flows are higher between pairs of countries that share a common language. [3]

Second, in order to capture the effect of religious similarity on trade, we introduce a dummy variable *Religion,* which takes one if the two countries have the same representative religion and zero otherwise. The representative religion in each country is a religion which covers the majority of the country (see Appendix 1).[4]

Third, we add two different dummy variables to capture colonial ties in history: *ImColonizer* and *ExColonizer*. *ImColonizer* (*ExColonizer*) is a binary variable which takes one if an importer (an exporter) was ever a colonizer of an exporter (an importer)

[3] More comprehensive measures of linguistic similarity have been introduced in some studies (see, for example, Boisso and Ferrantino, 1997; Guo, 2004; Noland, 2005). Unlike other studies using a comprehensive measure, we cover many countries (118) in our sample and construction of a comprehensive measure of linguistic similarity for the pairs of 13,806 (=118 X 117) is a very difficult task.

[4] More comprehensive measures of religious similarity have also been introduced in some studies (see, for example, Guo, 2004; Hwang and Guo, 2004; Noland, 2005). While these papers cover only 23 countries at most, we cover 118 countries and hence construction of a comprehensive of religious similarity is a very difficult task.

and zero otherwise. The effect of colonial ties on trade has been under examination for a long time, and particularly since the 1970s (see, for example, Kleiman, 1976, 1977, 1978; Livingstone, 1976). Recently, scholars have increasingly performed quantitative studies on the role of colonial ties in trade by adding colonial-ties-related dummy variables into a gravity equation, and they have found a positive relationship between colonial ties and trade (see, for example, Rauch, 1999; Estevaderorada *et al.*, 2002; Rauch and Trindade, 2002; Bhattacharjea, 2004).

Consequently, we estimate the following gravity equation:

$$\ln T_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln perCapita_i + \beta_4 \ln perCapita_j + \beta_5 \ln Area_i + \beta_6 \ln Area_j + \beta_7 \ln Remoteness_i + \beta_8 \ln Remoteness_j + \beta_9\, Contig_{ij} + \beta_{10}\, Island_{ij} + \beta_{11} \ln Distance_{ij} + \beta_{12}\, Religion_{ij} + \beta_{13}\, Language_{ij} + \beta_{14}\, ImColonizer_{ij} + \beta_{15}\, ExColonizer_{ij} + \beta_{16}\, WTO_i + \beta_{17}\, WTO_j + \beta_{18}\, RTA_{ij} + \varepsilon_{ij}.$$

The dependent variable is import value of agricultural products or manufactured goods, respectively. *perCapita*, *Area*, and *Remoteness*[5] are GDP per capita, land area (in square kilometers), and relative distance, respectively. *Contig* is a binary variable which takes one if the two countries share a common land border and zero otherwise. *Island* is the number of island countries and takes zero, one, or two. *WTO* is a binary variable which takes one if the country is a member of the World Trade Organization and zero otherwise. Lastly, we include a binary variable *RTA*, which takes one if the partner countries belong to a common regional trade arrangement and zero otherwise.

In addition to these variables, further independent variables are introduced. First, as in Paiva (2005), we add each country's share of agricultural products in GDP and rural population density to take the specific importance of agricultural activity into consideration. In the equation applicable for manufactured goods, the share of manufactures in GDP is added. *ExShare* (*ImShare*) and *ExRural* (*ImRural*) denote the share of the exporter's (importer's) manufactured goods/agricultural products sector in GDP and the exporter's (importer's) rural population density, respectively. Second, we add intra-regional dummy variables (*Africa*, *America*, *Asia*, *Europe*, and *Pacific*), which

[5] $Remoteness_j$ is calculated as log $[1/\Sigma_i(GDP_i/GDP_w)/Distance_{ij}]$, where GDP_w = world *GDP*.

take one if the trading partners belong to the same region and zero otherwise. Such regional dummy variables have a certain role in representing differences in region-specific preferences.

The total number of countries included in our dataset is 118 for which all of our variables are available. See Appendix 2 for the complete list of the countries. The definition and source of trade data are offered in Appendix 3. The basic statistics are reported in Table 1.

== Table 1 ==

3. Empirical Results

An overview of the relationship between cultural variables and the mean values of trade is presented in Table 2. Cultural dummy variables, *ExColonizer*, *ImColonizer*, *Religion*, and *Language*, are indicated in the first column. Each variable takes unity if trading partners share the same cultural attribute and zero otherwise. Mean values for manufacturing and agricultural trade are reported in the second and the third column, respectively.

== Table 2 ==

We readily note the larger mean values for trade between countries with the same language in both manufacturing and agricultural trade. In manufactured goods, the mean value for trade in pairs with the same language is US$ 499.1 million, while that in pairs with different languages is US$ 258.5 million. On the other hand, in agricultural products these mean values are US$ 64.4 million and US$ 27.3 million, respectively. Thus, country pairs with the same language trade about twice larger amount than country pairs with different languages. Therefore, we can say that both manufacturing trade and agricultural trade are sensitive to linguistic ties between trading countries.

The table also shows that both manufacturing trade and agricultural trade are greater between the country pairs with the same representative religion. In the case of the *Religion* dummy variable, the mean value for manufacturing trade in pairs with the same representative religion is US$ 439.2 million, while the corresponding value in pairs with different religion is US$ 197.9 million. On the other hand, in agricultural products, the corresponding mean values are US$ 57 million and US$ 17 million. We also find a similar trade pattern in the cases of *ExColonizer* and *ImColonizer* dummy variables.

In sum, we find larger mean values for trade between countries having the same cultural attribute in both manufacturing and agricultural trade. However, this table does not show with certainty the magnitude of the difference in the effect of cultural ties between manufacturing and agricultural trade.

Therefore we regress the gravity equations set out above and conduct the Wald test with the null hypothesis that respective coefficients for cultural variables are identical in both equations for manufacturing and agricultural trade. Here, we use the method of ordinary least squares (OLS) by equation[6] because the same regressors show up in each equation and therefore the OLS estimates become equivalent to the generalized least squares estimates.[7]

The regression results are listed in Table 3. Eq. (1) shows baseline results for trade in manufactured goods and agricultural products, and Eq. (2) shows the results after adding each country's share of manufactured goods/agricultural products in GDP and rural population density. Lastly, Eq. (3) shows the results when the regional dummy variables *Africa*, *America*, *Asia*, *Europe*, and *Pacific* have been included.

== Table 3 ==

We shall now examine the results shown by Eq. (1). The estimated coefficients for most of the standard gravity variables have the expected signs. For both

[6] We perform generalized least squares estimation in order to obtain the covariances between the estimates from different equations, which are needed to perform the Wald test.

[7] In general, separate estimation of two regressions may be accompanied by correlated estimation errors. That is, the error term in the agricultural equation could possibly be non-orthogonal to that in the manufacturing equation. This correlation is plausible because the unobservable elements, such as non-tariff barriers between trading partners, would simultaneously affect both trades. Therefore, we should usually apply the GLS method, which gives us more efficient estimators than OLS estimators.

manufactured and agricultural products, trade is positively correlated with GDPs of both exporter and importer and is adversely affected by increasing geographical distance between the trading partners. Moreover, exporting countries' remoteness is found to have a positive effect on both manufacturing and agricultural trade. Per capita income is found to have a positive impact on both manufacturing and agricultural imports. It is also found that the larger countries trade less and country pairs sharing the geographic border trade more between them. Membership of the WTO and the common regional trade arrangement seems to have a positive effect for both manufacturing and agricultural trade.

Our main interest in this paper lies in the coefficients for cultural variables, i.e., *Language*, *Religion*, *ImColonizer*, and *ExColonizer*. The results with respect to those variables can be summarized as follows.

First, the coefficient for *Language* is slightly larger for agricultural trade than for manufacturing trade: the coefficients for the *Language* dummy variable are 1.53 and 1.57 for manufacturing trade and agricultural trade, respectively. Thus, countries using the same language trade 362 percent and 381 percent more of manufacturing product and agricultural product, respectively, ceteris paribus.[8] In this case, however, the Wald test does not reject the hypothesis that the coefficient is the same in each instance. Therefore, in this particular specification, the effect of linguistic commonality does not show a statistical difference between agricultural trade and manufacturing trade.

Second, the coefficient for *Religion* is statistically greater in agricultural trade than in manufacturing trade. The estimated coefficients for the *Religion* dummy variable are -0.07 and 0.45 in manufacturing trade and agricultural trade, respectively, and the coefficient in the equation for agricultural trade is significant at the one percent level. Thus, the country pairs with the same representative religion trade 57 percent more of agricultural products than the country pairs with different religions.[9] It is also shown that at the 1% level, the Wald test rejects the hypothesis that the coefficient is the same in both cases. This result indicates that similarity of religion affects agricultural trade more strongly than manufacturing trade.

Third, we find that the coefficients for the colonizer dummy variables

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8 100 X [exp(1.53) – 1.0] = 362 percent; 100 X [exp(1.57) – 1.0] = 381 percent;

9 100 X [exp(0.45) – 1.0] = 57 percent.

(*ImColonizer* and *ExColonizer*) for agricultural trade are larger than those for manufacturing trade. The estimated coefficients for *ImColonizer* (*ExColonizer*) in the equation for manufacturing trade are 0.89 and 0.20, respectively, while those in the equation for agricultural trade are 2.01 and 1.71, respectively. Thus the country pairs with the colonial ties trade 22 percent to 144 percent more of manufacturing products and 453 percent to 646 percent more of agricultural products than the countries pairs with no such ties.[10] The Wald test rejects the hypothesis that the respective coefficients are the same. This result indicates that a colonial relationship plays a more critical role in agricultural trade than in manufacturing trade.

Equation (2) introduces the share of manufactured goods/agricultural products in GDP and rural population density, as compared with Eq. (1). The independent variables included previously are well estimated. Estimates of these newly added variables indicate that a higher share of agricultural products (manufactured products) in GDP is associated with higher exports of agricultural products (manufactured products). Moreover, a higher rural population density tends to reduce agricultural (manufacturing) exports, as reported by Paiva (2005), reflecting the fact that less modern agricultural methods and equipment are employed in countries with a large rural population. The results for cultural variables are the same as the previous results: similarity of religion and a colonial relationship enhance agricultural trade more significantly than manufacturing trade.

The results shown by Eq. (3) are obtained with the inclusion of regional dummy variables (*Africa*, *America*, *Asia*, *Europe*, and *Pacific*). The coefficient for the intra-European dummy variable is negatively significant in both manufacturing trade and agricultural trade, although most of the coefficients for intra-regional dummy variables are estimated as insignificant. As in the previous two sets of results, cultural ties are more critical for agricultural trade than for manufacturing trade, although we again cannot find a statistical difference in the effect of linguistic commonality between the two types of trade.

In sum, the results set out above can be summarized as follows. Commonality of language, religion and a colonial relationship in history enhance agricultural trade

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[10] 100 X [exp(0.89) – 1.0] = 144 percent; 100 X [exp(0.20) – 1.0] = 22 percent; 100 X [exp(2.01) – 1.0] = 646 percent; 100 X [exp(1.71) – 1.0] = 453 percent;

more significantly than manufacturing trade. Thus, we can state that trade in agricultural products depends more heavily on cultural ties between trading partners than trade in manufactured goods.

4. Robustness Checks

Using the Three Year Average of the Imports Value

To check the robustness of our results set out above, we again estimate the same equation with a 3-year (2002, 2003, and 2004) average of the imports value. This averaging is performed, as in Paiva (2005), in order to smooth out possible instability of agricultural production due to factors such as a bad harvest. OLS results for this estimation are reported in Table 4. The results with respect to most variables are qualitatively the same as those in the previous sets of results. A striking difference from the previous results is that the effect of linguistic similarity turns out to be statistically different between agricultural trade and manufacturing trade. This is confirmed at the ten to one percent level by the Wald test. In Eq. (1), the coefficients for the *Language* dummy variable are 1.11 and 1.38 in manufacturing trade and agricultural trade, respectively. More precisely, manufacturing trade is 203% and agricultural trade is 297% larger between countries using the same language, ceteris paribus.[11] Similar patterns are shown in Eqs. (2) and (3). Thus, we now have evidence that linguistic similarity has a greater effect on trade in agricultural products than on trade in manufactured goods.

== Table 4 ==

Using Differentiated Products

It is possible that our results are sensitive to the characteristics of traded products. Rauch (1999) claims that cultural ties are more important for differentiated products than for homogenous products because search costs incurred in matching

[11] 100 X [exp(1.11) – 1.0] = 203 percent; 100 X [exp(1.38) – 1.0] = 297 percent;

international buyers and sellers are higher for differentiated products. Now suppose that most agricultural trade consists of trade in differentiated agricultural products. Then, even if the effect of cultural ties on trade is indifferent between manufactured goods and agricultural products, the coefficients for cultural variables would be estimated to be larger in the agricultural equation than in the manufacturing equation. However, we assert that, even in differentiated products, agricultural trade is more sensitive to cultural ties than manufacturing trade, due to the more strongly divergent tastes for agricultural products. Therefore, we need to consider fully the characteristics of the traded products.

There are two approaches for control of such product characteristics. The first approach is an indirect one involving restriction of the sample only to trade among developed countries, *e.g.*, OECD countries. This is based on the expectation that specialization in different products is much more prevalent in the industrialized countries (Feenstra, 2004). On restricting our sample only to trade among OECD countries, however, we lose variation in cultural ties, since most of the cultural ties, *e.g.*, a colonial relationship, can be observed between developing and developed countries. Therefore, we employ a second approach, which directly restricts the sample only to trade in differentiated products. Information on such product characteristics is drawn from Rauch (1999).

In Rauch (1999), two definitions are proposed in order to account for ambiguities arising in classification: a conservative definition (minimizing the number of homogeneous goods) and a liberal definition (maximizing this number). In the classification, for example, meat extracts and juices (SITC 0141), macaroni, spaghetti and similar products (0483), vegetables prepared or preserved (0565), sugars and syrups (0619), coffee extracts, essences or concentrates (0712), and chocolate and other preparations containing cocoa (0730) are classified as differentiated products, although these products are not classified as differentiated products in a liberal classification. Employing both classifications separately, we regress the gravity equations specified above for trade in differentiated agricultural products and manufactured goods.

The results with the use of a conservative classification and with the use of a liberal classification are reported in Tables 5 and 6, respectively. We see that the results do not differ substantially between the two tables. The magnitudes of all the coefficients for cultural variables are larger for agricultural trade than for manufacturing trade. On the other hand, the coefficients for *ExColonizer* in Tables 5 and 6 notably increase in both manufacturing trade and agricultural trade, compared with those in Table 3. In manufacturing trade, as well as for *ExColonizer*, the coefficients for *ImColonizer* become larger in Tables 5 and 6. These increases in cultural coefficients in Tables 5 and 6 may be considered to be due to Rauch's claim: higher search costs for differentiated products. In spite of such increases in cultural coefficients for manufacturing trade, we still find statistically greater coefficients for cultural variables for agricultural trade than for manufacturing trade.

== Tables 5 & 6 ==

5. Concluding Remarks

We have investigated the relationship between trade and cultural ties, and we have found that commonality of religion and a colonial relationship enhance agricultural trade more than manufacturing trade. That is, we can draw the conclusion that trade in agricultural products depends more heavily on cultural ties between the trading partners than trade in manufactured goods.

Throughout history, the intercultural exchange of crops and livestock breeds has revolutionized diets all over the world. The recently initiated phenomenon of "globalization", which refers to ever-increasing mobility of goods, services, labor, information, technology, and capital throughout the world, is indeed continuing to accelerate the harmonization of diets between various cultures. Therefore, trade in agricultural products may increase very noticeably in the future.

Appendix 1. Representative Religion

Buddhist

Cambodia, China, Japan, Mongolia, Myanmar, Rep. of Korea, Sri Lanka, Thailand, Viet Nam

Christian

Argentina, Armenia, Australia, Austria, Belgium, Bolivia, Brazil, Burundi, Canada, Cape Verde, Chile, Colombia, Costa Rica, Croatia, Czech Rep., Cote d'Ivoire, Denmark, Dominica, Ecuador, El Salvador, Estonia, Finland, France, Gabon, Georgia, Germany, Ghana, Grenada, Guatemala, Guyana, Honduras, Hungary, Iceland, Ireland, Italy, Kenya, Latvia, Lithuania, Malawi, Mexico, Namibia, Netherlands, New Zealand, Nicaragua, Norway, Panama, Papua New Guinea, Peru, Philippines, Poland, Portugal, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Sao Tome and Principe, Seychelles, Slovenia, Spain, Sweden, Trinidad and Tobago, Uganda, United Kingdom, United Rep. of Tanzania, Uruguay, USA, Venezuela, Zambia

Daoist	Hindu	Jewish
China	India, Mauritius, Nepal	South Africa

Muslim

Albania, Algeria, Azerbaijan, Bangladesh, Bosnia Herzegovina, Egypt, Eritrea, Ethiopia, Gambia, Indonesia, Iran, Jordan, Kazakhstan, Kyrgyzstan, Lebanon, Malaysia, Maldives, Morocco, Niger, Nigeria, Oman, Pakistan, Saudi Arabia, Senegal, Sudan, Tunisia, Turkey, Yemen

Orthodox

Belarus, Bulgaria, Greece, Russian Federation, Ukraine

Indigenous beliefs

Burkina Faso, Cameroon, Central African Rep., China, Madagascar, Togo

Note: We specified as a representative religion in each country a religion that covers the majority of the country.

Source: Authors' specification based on World Factbook (CIA).

Appendix 2. Country List

Africa

Algeria, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Rep., Cote d'Ivoire, Egypt, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Kenya, Madagascar, Malawi, Mauritius, Morocco, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, South Africa, Sudan, Togo,

America

Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominica, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Uruguay, USA, Venezuela

Asia

Armenia, Azerbaijan, Bangladesh, Cambodia, China, Georgia, India, Indonesia, Iran, Japan, Jordan, Kazakhstan, Kyrgyzstan, Lebanon, Malaysia, Maldives, Mongolia, Nepal, Pakistan, Philippines, Russian Federation, Saudi Arabia, Sri Lanka, Thailand, Viet Nam, Yemen

Europe

Albania, Austria, Belarus, Belgium, Bosnia Herzegovina, Bulgaria, Croatia, Czech Rep., Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Turkey, Ukraine, United Kingdom

Pacific

Australia, New Zealand, Papua New Guinea

Appendix 3. Definition and Source of Variables

1. Agricultural products are defined as the products categorized in 0 (food and live animals) and 1 (beverages and tobacco), and manufactured goods as the goods categorized in 6 (manufactured goods classified chiefly by material), 7 (machinery and transport equipment), and 8 (miscellaneous manufactured articles), in SITC Rev. 3, respectively. Information on the value of agricultural and manufacturing imports of 118 countries was obtained from the UN Comtrade Database. We use the bilateral trade values for manufactured goods and agricultural products for the year 2003.
2. Data on area, GDP, and GDP per capita were obtained from World Development Indicator.
3. The religion and language for each country are taken from World Fact Book produced by the United States Central Intelligence Agency (CIA).
4. Rural population density is taken from World Development Indicator.
5. The shares of the manufacturing and agricultural sectors in GDP are taken from World Development Indicator, Source OECD, and China Statistical Yearbook.
6. Information on WTO is taken from the WTO website[12].
7. RTA dummy was obtained from Kimura, Kuno, and Hayakawa (2006), and its original source was the WTO website.
8. The source of all other variables, including the distance and the colonial relationship between countries, was CEPII[13].

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[12] http://www.wto.org
[13] http://www.cepii.fr/anglaisgraph/bdd/distances.htm#

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Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ln Manu	13,806	10.13	7.32	0	25.77
ln Agri	13,806	8.12	7.30	0	23.30
ln Distance	13,806	8.70	0.78	4.39	9.89
ln GDP	13,806	23.82	2.35	17.77	29.96
ln Remoteness	13,806	8.55	0.53	7.13	9.39
ln perCapita	13,806	7.68	1.55	4.66	10.55
ln Area	13,806	12.02	2.28	5.70	16.64
Contig	13,806	0.02	0.14	0	1
Island	13,806	0.32	0.52	0	2
WTO	13,806	0.88	0.32	0	1
RTA	13,806	0.17	0.37	0	1
ln Share (Manu)	13,806	2.61	0.48	1.26	3.55
ln Share (Agri)	13,806	2.25	1.02	-0.01	4.10
ln Rural	13,806	5.38	1.24	1.22	8.63
ImColonizer	13,806	0.01	0.09	0	1
ExColonizer	13,806	0.01	0.09	0	1
Religion	13,806	0.39	0.49	0	1
Language	13,806	0.14	0.35	0	1

Table 2. Cultural Ties and the Mean Value of Trade

(Unit: US$ million)

		Manu	Agri
Language			
	0	258.5	27.3
		(11,888)	(11,888)
	1	499.1	64.4
		(1,918)	(1,918)
Religion			
	0	197.9	16.8
		(8,426)	(8,426)
	1	439.2	57.1
		(5,380)	(5,380)
ExColonizer			
	0	282.8	31.7
		(13,692)	(13,692)
	1	1,385.9	128.8
		(114)	(114)
ImColonizer			
	0	284.6	31.2
		(13,692)	(13,692)
	1	1,174.2	181.6
		(114)	(114)

Note: The number of observations is shown in parentheses.

Table 3. Regression Results in 2003

	Eq. (1)			Eq. (2)			Eq. (3)		
	Manu		Agri	Manu		Agri	Manu		Agri
Language_ij	1.53***	<	1.57***	1.60***	>	1.58***	1.35***	<	1.46***
	(0.11)		(0.13)	(0.11)		(0.13)	(0.12)		(0.13)
Religion_ij	-0.07	<***	0.45***	-0.04	<***	0.43***	-0.05	<***	0.44***
	(0.08)		(0.09)	(0.08)		(0.09)	(0.08)		(0.09)
IMColonizer_ij	0.89**	<**	2.01***	0.77*	<***	1.94***	0.81**	<**	1.87***
	(0.41)		(0.45)	(0.41)		(0.45)	(0.41)		(0.45)
EXColonizer_ij	0.20	<***	1.71***	0.56	<***	1.82***	0.60	<***	1.75***
	(0.41)		(0.45)	(0.41)		(0.45)	(0.41)		(0.45)
Distance_ij	-1.89***		-1.97***	-1.93***		-1.96***	-1.88***		-2.08***
	(0.06)		(0.07)	(0.06)		(0.07)	(0.08)		(0.09)
ln GDP_i	1.43***		1.06***	1.40***		1.04***	1.40***		1.03***
	(0.04)		(0.04)	(0.04)		(0.04)	(0.04)		(0.04)
ln GDP_j	2.12***		2.05***	2.01***		2.21***	2.00***		2.21***
	(0.04)		(0.04)	(0.04)		(0.04)	(0.04)		(0.04)
ln Remoteness_i	0.10		-1.19***	0.00		-1.15***	-0.23**		-1.27***
	(0.10)		(0.11)	(0.10)		(0.11)	(0.11)		(0.12)
ln Remoteness_j	0.28***		2.15***	0.52***		2.21***	0.29***		2.09***
	(0.10)		(0.11)	(0.10)		(0.11)	(0.11)		(0.12)
ln perCapita_i	0.10**		0.38***	0.17***		0.18**	0.21***		0.21***
	(0.04)		(0.05)	(0.05)		(0.07)	(0.05)		(0.07)
ln perCapita_j	0.06		0.05	0.05		0.32***	0.10**		0.35***
	(0.04)		(0.05)	(0.05)		(0.07)	(0.05)		(0.07)
ln Area_i	-0.19***		-0.05	-0.12***		-0.03	-0.13***		-0.03
	(0.03)		(0.03)	(0.04)		(0.04)	(0.04)		(0.04)
ln Area_j	-0.36***		-0.36***	-0.37***		-0.56***	-0.38***		-0.56***
	(0.03)		(0.03)	(0.04)		(0.04)	(0.04)		(0.04)
Contig_ij	0.81***		1.35***	0.71**		1.34***	0.71**		1.27***
	(0.28)		(0.31)	(0.28)		(0.31)	(0.28)		(0.31)
Island	-0.11		-0.34***	-0.12		-0.35***	-0.12		-0.35***
	(0.08)		(0.09)	(0.08)		(0.09)	(0.08)		(0.09)
WTO_i	0.65***		-0.17	0.75***		-0.06	0.76***		-0.04
	(0.12)		(0.13)	(0.12)		(0.13)	(0.12)		(0.13)
WTO_j	1.22***		1.49***	0.71***		1.24***	0.72***		1.26***
	(0.12)		(0.13)	(0.12)		(0.13)	(0.12)		(0.13)
RTA_ij	0.84***		0.42***	0.80***		0.41***	0.92***		0.59***
	(0.11)		(0.12)	(0.11)		(0.12)	(0.11)		(0.13)
ln ImShare				-0.20**		-0.38***	-0.16*		-0.38***
				(0.09)		(0.09)	(0.09)		(0.09)
ln ExShare				1.27***		0.81***	1.32***		0.82***
				(0.09)		(0.09)	(0.09)		(0.09)
ln ImRural				0.13***		0.00	0.11***		-0.02
				(0.04)		(0.05)	(0.04)		(0.05)
ln ExRural				-0.10**		-0.27***	-0.12***		-0.28***
				(0.04)		(0.05)	(0.04)		(0.05)
Africa							1.26***		0.31
							(0.17)		(0.19)
America							0.36*		-0.07
							(0.21)		(0.24)
Asia							0.29		0.02
							(0.18)		(0.20)
Europe							-1.12***		-1.26***
							(0.21)		(0.23)
Pacific							2.87*		2.90
							(1.72)		(1.92)
constant	-57.94***		-57.01***	-59.17***		-59.09***	-55.90***		-55.92***
	(1.65)		(1.84)	(1.65)		(1.99)	(1.76)		(2.11)
Obs.	13,806		13,806	13,806		13,806	13,806		13,806
R-sq	0.6662		0.5851	0.6731		0.5894	0.6756		0.5905

Notes: ***, **, and * show 1%, 5%, and 10% levels of significance, respectively. Standard error. Is given in parentheses. The column between "manu" and "agri" reports the result of the Wald test with the null hypothesis that each coefficient (only for cultural variables) is identical in the manufacturing and agricultural trade equations.

Table 4. Regression Results for average of 3 years

	Eq. (1)			Eq. (2)			Eq. (3)		
	Manu		Agri	Manu		Agri	Manu		Agri
Language_ij	1.11***	<**	1.38***	1.17***	<*	1.38***	0.93***	<***	1.27***
	(0.10)		(0.12)	(0.10)		(0.12)	(0.10)		(0.12)
Religion_ij	-0.03	<***	0.37***	-0.01	<***	0.35***	-0.01	<***	0.37***
	(0.07)		(0.08)	(0.07)		(0.08)	(0.07)		(0.08)
IMColonizer_ij	0.29	<***	1.43***	0.22	<**	1.33***	0.29	<**	1.26***
	(0.36)		(0.43)	(0.36)		(0.42)	(0.36)		(0.42)
EXColonizer_ij	0.58	<**	1.57***	0.87**	<*	1.67***	0.94***		1.60***
	(0.36)		(0.43)	(0.36)		(0.42)	(0.36)		(0.42)
Distance_ij	-1.83***		-2.04***	-1.86***		-2.03***	-1.78***		-2.15***
	(0.05)		(0.06)	(0.05)		(0.06)	(0.07)		(0.08)
ln GDP_i	1.39***		1.08***	1.40***		1.13***	1.40***		1.13***
	(0.03)		(0.04)	(0.04)		(0.04)	(0.04)		(0.04)
ln GDP_j	1.89***		1.92***	1.80***		2.07***	1.80***		2.07***
	(0.03)		(0.04)	(0.04)		(0.04)	(0.04)		(0.04)
ln Remoteness_i	-0.09		-1.28***	-0.08		-1.14***	-0.24**		-1.24***
	(0.09)		(0.10)	(0.09)		(0.11)	(0.10)		(0.11)
ln Remoteness_j	0.28***		2.08***	0.47***		2.14***	0.30***		2.04***
	(0.09)		(0.10)	(0.09)		(0.11)	(0.10)		(0.11)
ln perCapita_i	-0.03		0.23***	-0.04		-0.08	0.00		-0.04
	(0.04)		(0.04)	(0.04)		(0.07)	(0.04)		(0.07)
ln perCapita_j	0.04		0.07	0.03		0.31***	0.06		0.34***
	(0.04)		(0.04)	(0.04)		(0.07)	(0.04)		(0.07)
ln Area_i	-0.13***		-0.02	-0.14***		-0.10**	-0.15***		-0.11***
	(0.03)		(0.03)	(0.03)		(0.04)	(0.03)		(0.04)
ln Area_j	-0.30***		-0.28***	-0.32***		-0.47***	-0.32***		-0.48***
	(0.03)		(0.03)	(0.03)		(0.04)	(0.03)		(0.04)
Contig_ij	0.71***		0.96***	0.61**		0.96***	0.66***		0.89***
	(0.25)		(0.29)	(0.24)		(0.29)	(0.24)		(0.29)
Island	-0.37***		-0.56***	-0.40***		-0.60***	-0.39***		-0.60***
	(0.07)		(0.08)	(0.07)		(0.08)	(0.07)		(0.08)
WTO_i	0.91***		0.07	0.91***		0.16	0.90***		0.19
	(0.10)		(0.12)	(0.11)		(0.12)	(0.11)		(0.12)
WTO_j	1.23***		1.52***	0.82***		1.29***	0.81***		1.32***
	(0.10)		(0.12)	(0.11)		(0.12)	(0.11)		(0.12)
RTA_ij	0.59***		0.33***	0.57***		0.34***	0.59***		0.50***
	(0.10)		(0.11)	(0.10)		(0.11)	(0.10)		(0.12)
ln ImShare				-0.01		-0.39***	0.04		-0.39***
				(0.08)		(0.08)	(0.08)		(0.08)
ln ExShare				1.03***		0.74***	1.09***		0.75***
				(0.08)		(0.08)	(0.08)		(0.08)
ln ImRural				-0.02		-0.17***	-0.02		-0.19***
				(0.04)		(0.04)	(0.04)		(0.04)
ln ExRural				-0.08**		-0.26***	-0.09**		-0.28***
				(0.04)		(0.04)	(0.04)		(0.04)
Africa							1.30***		0.33*
							(0.15)		(0.18)
America							0.35*		-0.20
							(0.19)		(0.22)
Asia							0.05		0.00
							(0.16)		(0.18)
Europe							-0.62***		-1.18***
							(0.18)		(0.22)
Pacific							2.71*		2.41
							(1.52)		(1.80)
constant	-49.73***		-51.83***	-50.63***		-53.05***	-49.21***		-50.39***
	(1.45)		(1.72)	(1.45)		(1.87)	(1.56)		(1.98)
Obs.	13,806		13,806	13,806		13,806	13,806		13,806
R-sq	0.6885		0.6054	0.6938		0.6100	0.6962		0.6111

Note: See notes on Table 3.

Table 5. Regression Results for Differentiated Products: Conservative Definition

	Eq. (1)			Eq. (2)			Eq. (3)		
	Manu		Agri	Manu		Agri	Manu		Agri
Language_ij	1.08***	<**	1.41***	1.14***	<	1.37***	1.19***	<	1.35***
	(0.12)		(0.13)	(0.12)		(0.13)	(0.12)		(0.13)
Religion_ij	-0.17**	<***	0.50***	-0.16*	<***	0.45***	-0.19**	<***	0.41***
	(0.08)		(0.09)	(0.08)		(0.09)	(0.09)		(0.09)
IMColonizer_ij	1.10**	<	1.95***	1.08**	<	1.87***	1.16***	<	1.97***
	(0.44)		(0.46)	(0.43)		(0.46)	(0.43)		(0.46)
EXColonizer_ij	1.96***	<**	3.19***	2.22***	<*	3.19***	2.30***	<*	3.29***
	(0.44)		(0.46)	(0.43)		(0.46)	(0.43)		(0.46)
Distance_ij	-2.47***		-1.64***	-2.49***		-1.61***	-2.24***		-1.36***
	(0.06)		(0.07)	(0.06)		(0.07)	(0.08)		(0.09)
ln GDP_i	1.32***		0.69***	1.34***		0.72***	1.35***		0.73***
	(0.04)		(0.04)	(0.04)		(0.04)	(0.04)		(0.05)
ln GDP_j	1.91***		1.37***	1.91***		1.59***	1.92***		1.60***
	(0.04)		(0.04)	(0.04)		(0.04)	(0.04)		(0.05)
ln Remoteness_i	0.52***		-0.79***	0.59***		-0.65***	0.63***		-0.67***
	(0.11)		(0.11)	(0.11)		(0.12)	(0.12)		(0.12)
ln Remoteness_j	0.25**		0.56***	0.57***		0.83***	0.62***		0.81***
	(0.11)		(0.11)	(0.11)		(0.12)	(0.12)		(0.12)
ln perCapita_i	-0.18***		0.44***	-0.23***		0.09	-0.26***		0.06
	(0.04)		(0.05)	(0.05)		(0.07)	(0.05)		(0.07)
ln perCapita_j	0.11**		0.40***	-0.02		0.23***	-0.05		0.20***
	(0.04)		(0.05)	(0.05)		(0.07)	(0.05)		(0.07)
ln Area_i	-0.23***		-0.02	-0.27***		-0.09**	-0.27***		-0.09**
	(0.03)		(0.03)	(0.04)		(0.04)	(0.04)		(0.04)
ln Area_j	-0.27***		-0.17***	-0.41***		-0.49***	-0.41***		-0.48***
	(0.03)		(0.03)	(0.04)		(0.04)	(0.04)		(0.04)
Contig_ij	1.55***		1.60***	1.44***		1.62***	1.61***		1.79***
	(0.30)		(0.31)	(0.30)		(0.31)	(0.30)		(0.31)
Island	-0.26***		0.04	-0.33***		-0.08	-0.33***		-0.07
	(0.08)		(0.09)	(0.08)		(0.09)	(0.08)		(0.09)
WTO_i	0.38***		-0.05	0.31**		0.06	0.30**		0.04
	(0.12)		(0.13)	(0.13)		(0.13)	(0.13)		(0.13)
WTO_j	1.36***		0.84***	0.92***		0.72***	0.90***		0.69***
	(0.12)		(0.13)	(0.13)		(0.13)	(0.13)		(0.13)
RTA_ij	0.80***		0.54***	0.78***		0.58***	0.54***		0.37***
	(0.12)		(0.12)	(0.12)		(0.12)	(0.12)		(0.13)
ln ImShare				0.14		-0.47***	0.11		-0.48***
				(0.10)		(0.09)	(0.10)		(0.09)
ln ExShare				1.06***		0.25***	1.02***		0.24**
				(0.10)		(0.09)	(0.10)		(0.09)
ln ImRural				-0.09*		-0.17***	-0.07		-0.16***
				(0.04)		(0.05)	(0.05)		(0.05)
ln ExRural				-0.30***		-0.52***	-0.28***		-0.51***
				(0.04)		(0.05)	(0.05)		(0.05)
Africa							0.20		0.43**
							(0.18)		(0.19)
America							0.44*		0.70***
							(0.23)		(0.24)
Asia							0.24		0.20
							(0.19)		(0.20)
Europe							1.54***		1.20***
							(0.22)		(0.24)
Pacific							3.17*		4.85**
							(1.84)		(1.94)
constant	-51.25***		-33.14***	-51.75***		-30.34***	-54.70***		-32.13***
	(1.76)		(1.85)	(1.76)		(2.03)	(1.89)		(2.15)
Obs.	13,806		13,806	13,806		13,806	13,806		13,806
R-sq	0.6038		0.4734	0.6092		0.4796	0.6106		0.4809

Note: See notes on Table 3.

Table 6. Regression Results for Differentiated Products: Liberal Definition

	Eq. (1)			Eq. (2)			Eq. (3)		
	Manu		Agri	Manu		Agri	Manu		Agri
Language_ij	1.05***	<***	1.43***	1.12***	<*	1.38***	1.11***	<	1.34***
	(0.12)		(0.12)	(0.12)		(0.12)	(0.12)		(0.13)
Religion_ij	-0.16**	<***	0.49***	-0.15*	<***	0.44***	-0.17**	<***	0.39***
	(0.08)		(0.09)	(0.08)		(0.09)	(0.08)		(0.09)
IMColonizer_ij	1.29***	<*	2.17***	1.26***	<	2.09***	1.34***	<*	2.22***
	(0.42)		(0.45)	(0.42)		(0.44)	(0.42)		(0.45)
EXColonizer_ij	1.48***	<***	3.38***	1.78***	<***	3.37***	1.86***	<***	3.51***
	(0.42)		(0.45)	(0.42)		(0.44)	(0.42)		(0.45)
Distance_ij	-2.34***		-1.67***	-2.37***		-1.65***	-2.15***		-1.33***
	(0.06)		(0.07)	(0.06)		(0.07)	(0.08)		(0.08)
ln GDP_i	1.24***		0.66***	1.25***		0.69***	1.25***		0.69***
	(0.04)		(0.04)	(0.04)		(0.04)	(0.04)		(0.04)
ln GDP_j	2.01***		1.39***	1.97***		1.59***	1.97***		1.59***
	(0.04)		(0.04)	(0.04)		(0.04)	(0.04)		(0.04)
ln Remoteness_i	0.40***		-0.82***	0.46***		-0.67***	0.45***		-0.71***
	(0.10)		(0.11)	(0.11)		(0.11)	(0.11)		(0.12)
ln Remoteness_j	0.18*		0.63***	0.48***		0.88***	0.47***		0.83***
	(0.10)		(0.11)	(0.11)		(0.11)	(0.11)		(0.12)
ln perCapita_i	-0.11***		0.49***	-0.15***		0.11	-0.17***		0.08
	(0.04)		(0.04)	(0.05)		(0.07)	(0.05)		(0.07)
ln perCapita_j	0.18***		0.37***	0.09*		0.19***	0.07		0.15**
	(0.04)		(0.04)	(0.05)		(0.07)	(0.05)		(0.07)
ln Area_i	-0.15***		-0.02	-0.18***		-0.09**	-0.18***		-0.09**
	(0.03)		(0.03)	(0.04)		(0.04)	(0.04)		(0.04)
ln Area_j	-0.31***		-0.21***	-0.41***		-0.48***	-0.41***		-0.48***
	(0.03)		(0.03)	(0.04)		(0.04)	(0.04)		(0.04)
Contig_ij	1.61***		1.64***	1.49***		1.65***	1.63***		1.86***
	(0.29)		(0.30)	(0.29)		(0.30)	(0.29)		(0.30)
Island	-0.23***		0.08	-0.29***		-0.04	-0.29***		-0.03
	(0.08)		(0.09)	(0.08)		(0.09)	(0.08)		(0.09)
WTO_i	0.34***		0.08	0.27**		0.21*	0.26**		0.19
	(0.12)		(0.13)	(0.12)		(0.13)	(0.12)		(0.13)
WTO_j	1.23***		0.84***	0.75***		0.75***	0.74***		0.72***
	(0.12)		(0.13)	(0.12)		(0.13)	(0.12)		(0.13)
RTA_ij	0.77***		0.50***	0.74***		0.55***	0.55***		0.32**
	(0.11)		(0.12)	(0.11)		(0.12)	(0.12)		(0.12)
ln ImShare				0.16*		-0.53***	0.14		-0.54***
				(0.09)		(0.09)	(0.10)		(0.09)
ln ExShare				1.17***		0.15	1.15***		0.13
				(0.09)		(0.09)	(0.10)		(0.09)
ln ImRural				-0.06		-0.18***	-0.05		-0.17***
				(0.04)		(0.05)	(0.04)		(0.05)
ln ExRural				-0.23***		-0.46***	-0.22***		-0.44***
				(0.04)		(0.05)	(0.04)		(0.05)
Africa							0.41**		0.62***
							(0.17)		(0.18)
America							0.43*		0.85***
							(0.22)		(0.23)
Asia							0.28		0.35*
							(0.18)		(0.19)
Europe							1.13***		1.37***
							(0.22)		(0.23)
Pacific							3.03*		4.82**
							(1.78)		(1.89)
constant	-51.97***		-33.14***	-52.79***		-29.45***	-54.75***		-31.29***
	(1.71)		(1.80)	(1.71)		(1.97)	(1.83)		(2.09)
Obs.	13,806		13,806	13,806		13,806	13,806		13,806
R-sq	0.6313		0.4864	0.6368		0.4920	0.6376		0.4938

Note: See notes on Table 3.