THE IMPACT OF DOMINANT RELIGION ON INTERNATIONAL TRADE

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ABSTRACT

The destruction of New York's World Trade Center by religious fanatics on September 11, 2001 led many commentators to question whether religion and globalization are compatible. The relationship is complicated by its theoretical ambiguity: religion can both enhance and suppress economic activity in general, and its potential network effect can both create and divert trade. There have been few empirical studies to shed light on the matter, however. This paper fills this void by examining the empirical relationship between religion and international trade.

AN INTRODUCTION TO THE AMBIGUOUS ECONOMIC EFFECTS OF RELIGION

Religion is an institution that guides general economic behavior, and it therefore also affects the important economic activity of international trade. Religions often promote "economically-friendly" behavior, such as honesty, diligence, and the provision of public goods. But, because religions focus on spiritual issues rather than the "pursuit of happiness," they may also suppress people's motivation to engage in welfare-enhancing economic transactions. Religion's overall influence on trade-enhancing institutions is, therefore, ambiguous. (Iannaconne, 1998) observes in his survey of the literature on religion and economic activity that "religion seems to matter, but its impact is far from uniform." Iannaccone's survey also reveals how sparse the research on this issue is. How religion influences the institutions that directly affect international trade has not been systematically examined by economists.

Religion may also have a network effect that facilitates complex economic transactions among people in different countries. Religion's role in creating international trade networks has been investigated by (Greif, 1989; Grief, 1994; Rauch, 1999; Rauch, 2001; Rauch & Trindade, 1999). The sharing of religious beliefs can mitigate problems such as adverse selection, moral hazard, and default. Therefore, religion can facilitate complex economic transactions among people in different countries. These network effects of religion are not necessarily favorable to increased international trade, however. Networks can divert trade as well as create trade. Furthermore, networks may hinder the long-run growth of trade by limiting the entry of new participants and the inclusion of new products. Recent works by (Mokyr, 1990; Holmes & Schmitz, 1995; Parente & Prescott, 2000) showed that vested interests often obstruct competition and economic change, suggesting that networks may serve to protect certain participants from competition from those outside their network.

TESTING THE RELATIONSHIP BETWEEN RELIGION AND TRADE USING THE GRAVITY MODEL

These ambiguous theoretical results signal the need for an empirical study of religion's effects on international trade. In order to test the institutional and network effects of religion on trade, an augmented gravity model is applied. The gravity model normally explains 70 percent or more of the cross section variation in world trade volumes, and it has proven useful for examining the importance of potential influences on trade. The model is theoretically attractive because it can be derived from a number of traditional trade models; see (Linnemann, 1966; Leamer & Stern, 1970; Anderson, 1979; Deardorff, 1998).

The standard gravity equation specifies trade between a pair of countries to be a negative function of the distance between the countries and a positive function of their combined national products. This equation is usually augmented to account for geographic, ethno-linguistic, and economic conditions. A common form of the gravity model is

$$(1) \qquad tot_{ij} = a_0 + a_1(gdp_i gdp_j) + a_2(pop_i\ pop_j) + a_3 dist_{ij} + a_4 CONT_{ij} + a_5 LANG_{ij} + a_6 FTA_{ij} + u_{ij},$$

in which tot_{ij} is the log of bilateral trade between countries i and j, $gdp_i gdp_j$ is the log of GDP for i and j, $dist_{ij}$ is the log of geographic distance between i and j, $pop_i\ pop_j$ is the log of the product of the populations in country i and j, and CONT, LANG, and FTA are dummy variables for pairs of countries that have a contiguous border, a common language, and are members of the same active free trade area, respectively. For recent gravity studies see, for example, (Frankel, Stein & Wei, 1995; McCallum, 1995; Eichengreen & Irwin, 1996; Deardorff, 1998; Frankel & Romer, 1999; Freund, 2000; Freund & Weinhold, 2000; Frankel & Rose, 2002).

ADDING RELIGION VARIABLES TO THE GRAVITY EQUATION

For religion to substantially influence a country's institutions, it must be a dominant religion. Minor religions adhered to by a few people are unlikely to have much effect on a country's overall economic institutions and, hence, its aggregate level of international trade. A dominant religion can be defined as one that is followed by at least 75 percent of the country's population. Religion's network effect depends on whether people in different countries share the same religion. Therefore, to distinguish between religion's influence on trade through the institutional channel and the network channel, three dummy variables are introduced into the augmented gravity equation: DOM for each pair of countries in which one trade partner has a dominant religion, DIFDOM when trade partners both have dominant, but different, religions, and SAMEDOM for country pairs in which both countries have the same dominant religion. If a dominant religion's influence on a country's institutions has a general effect on its ability to engage in international trade, then the DOM and DIFDOM dummies should be significantly positive, with the latter being greater in magnitude than DOM. If the sharing of the same dominant religion has a positive network effect, then SAMEDOM dummy should be significantly positive.

In recognition of potential omitted variable bias, several institutional and network variables are added to equation (1): a dummy (LAW_{ij}) to capture the network effect of having a common legal structure using data from (Djankov, La Porta, Lopez-de-Silane & Shleifer, 2002), the bi-lateral average of (Kaufmann, Kraay & Zoido Lobaton's, 1999) government regulation variable ($burden_{ij}$) to capture other institutional effects, and two communications channels, $cyber_i cyber_j$ and $phone_i phone_j$, the log of the bilateral product of top domain web hosts and telephones per thousand in countries i and j, respectively [See data sources in the Appendix]. This leaves the extended gravity model:

$$
\begin{aligned}
(2) \qquad tot_{ij} = {} & a_0 + a_1(gdp_i gdp_j) + a_2(pop_i\, pop_j) + a_3 dist_{ij} + a_4 CONT_{ij} \\
& + a_5 LANG_{ij} + a_6 FTA_{ij} + a_7 DOM_{ij} + a_8 DIFDOM_{ij} \\
& + a_9 SAMEDOM_{ij} + a_{10} LAW_{ij} + a_{11}(burden_{ij}) \\
& + a_{12}(cyber_i cyber_j) + a_{13}(phone_i phone_j) + u_{ij}.
\end{aligned}
$$

REGRESSION RESULTS

Most studies estimate the gravity equation (2) in double logarithmic form so that the estimated coefficients can be interpreted as elasticities. This technique omits country pairs whose bilateral trade is zero, or about twenty percent of the observations in this study. Omitting these observations biases the results. Therefore, the scaled OLS (SOLS) technique first used by (Eichengreen & Irwin, 1995), in which the dependent variable is expressed as $\log(1 + TRADE_{ij})$. (Greene, 2003) shows that the transformed variable approximates a "semi-log Tobit relationship;" for small values of $TRADE_{ij}$ the logarithm is close to zero, and for large values of $TRADE_{ij}$ the logarithm of the transformed variable is close to the logarithm of $TRADE_{ij}$. This approach yields results that are similar to those for a Tobit regression, and the double log form is maintained.

To check for estimation robustness, equation (2) is also estimated using nonlinear least squares technique similar to that applied by (Coe & Hoffmaister, 1999; Coe, Subramanian & Tamarisa, 2002). This method essentially changes the equation into an exponential form, and by not actually

putting the data in logarithmic form we can include the observations for which trade is zero.

Column 2 in Table 1 presents the SOLS results for the baseline gravity model using data on the bilateral trade volumes between 84 countries during the year 1998. As is common for gravity models, nearly 80 percent of the variation in bilateral trade is explained. All signs are as expected and significant at the 95 percent level. Nonlinear estimates converted to be compatible with the logarithmic results of the SOLS regressions are given in Column 5; the similarity between columns 2 and 5 adds robustness to the results.

Table 1: The Gravity Model and Dominant Religions

	Equation (1) SOLS	Equation (2) SOLS	Equation (3) SOLS	Equation (1) Nonlinear	Equation (2) Nonlinear	Equation (3) Nonlinear
Constant	-6.695 (-24.62)**	-4.883 (-14.99)**	-4.714 (-14.10)**	-7.674 (-18.17)**	-6.777 (-10.39)**	-6.703 (-10.56)**
$gdp_i gdp_j$	0.687 (75.78)**	0.666 (30.87)**	0.668 (29.34)**	0.851 (43.09)**	0.861 (13.19)**	0.895 (11.94)**
$pop_i\ pop_j$	-0.072 (-5.81)**	-0.101 (-4.09)**	-0.111 (-4.26)**	-0.061 (-1.43)	-0.137 (-1.49)	-0.178 (-1.82)*
$dist_{ij}$	-0.594 (-24.61)**	-0.689 (-28.02)**	-0.696 (-27.73)**	-0.526 (-21.06)**	-0.596 (-19.79)**	-0.501 (-13.76)**
$CONT_{ij}$	0.759 (6.83)**	0.590 (5.49)**	0.575 (5.32)**	1.207 (6.69)**	1.042 (5.46)**	1.069 (5.48)**
$LANG_{ij}$	0.521 (7.72)**	0.243 (3.24)**	0.305 (4.02)**	0.457 (3.92)**	0.348 (2.50)**	0.420 (2.83)**
FTA_{ij}	0.475 (8.47)**	0.293 (5.29)**	0.282 (5.03)**	0.473 (4.17)**	0.362 (3.17)**	0.344 (2.48)**
DOM_{ij}		0.049 (1.02)			-0.140 (-1.08)	
SAME DOM_{ij}		-0.372 (-5.26)**			-0.126 (-2.75)**	
$DIFDOM_{ij}$		-0.314 (-5.78)**			-0.043 (-0.22)	

Table 1: The Gravity Model and Dominant Religions						
	Equation (1) SOLS	Equation (2) SOLS	Equation (3) SOLS	Equation (1) Nonlinear	Equation (2) Nonlinear	Equation (3) Nonlinear
LAW_{ij}		0.365 (7.96)**	0.354 (7.61)**		0.467 (6.13)**	0.451 (5.08)**
$burden_{ij}$		0.282 (4.34)**	0.366 (5.54)**		0.347 (1.32)	0.592 (2.11)**
cyber- $_i$cyber$_j$		0.081 (8.28)**	0.087 (8.23)**		0.105 (3.14)**	0.107 (2.28)**
$phone_i$ $phone_j$		-0.188 (-7.59)**	-0.215 (-8.23)**		-0.259 (-3.55)**	-0.328 (-2.95)**
DOM Buddhist			0.356 (3.47)**			0.421 (2.39)**
DOM Catholic			-0.157 (-3.04)**			-0.327 (-2.57)**
DOM Hindu			-0.386 (-3.17)**			-0.476 (-2.56)**
DOM Judaism			-0.331 (-1.86)*			-0.294 (-0.58)
DOM Muslim			-0.119 (-1.72)*			-0.174 (-0.94)
DOM Orthodox			0.024 (0.26)			0.155 (0.61)
DOM Protestant			-0.019 (-2.56)**			-0.310 (-2.14)**
SAME Buddhist			0.660 (2.11)**			0.625 (0.62)
SAME Catholic			-0.265 (-3.33)**			-0.101 (-0.37)
SAME Hindu			0.802 (0.78)			0.825 (1.44)
SAME Muslim			-0.042 (-0.21)			-0.039 (-0.07)
SAME Orthodox			0.878 (2.62)**			1.111 (2.34)**

Table 1: The Gravity Model and Dominant Religions

	Equation (1) SOLS	Equation (2) SOLS	Equation (3) SOLS	Equation (1) Nonlinear	Equation (2) Nonlinear	Equation (3) Nonlinear
SAME Protestant			0.005 (0.02)			0.280 (0.52)
R^2	0.783	0.800	0.800	0.816	0.823	0.834

Notes: Figures in parentheses are heteroskedasticity-consistent t-statistics. ** indicates significant at the 95% level, and * at the 90% level. With 84 countries, there are 3486 data points (=84*(83/2)). Dominant Buddist countries are Japan and Thailand, dominant Catholic countries are Argentina, Austria, Belgium, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, France, Guatemala, Honduras, Ireland, Italy, Mexico, Nicaragua, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Spain, and Venezuela, dominant Hindu countries are India and Nepal, the dominant Judaic country is Israel, dominant Muslim countries are Algeria, Bangladesh, Indonesia, Iran, Mauritania, Saudi Arabia, Tunisia, and Turkey, dominant Orthodox countries are Belarus, Georgia, Greece, Moldova, and Ukraine, dominant Protestant countries are Denmark, Estonia, Finland, Norway, Sweden, and the United Kingdom..

Columns 3 and 6 in Table 1 present the results for regression equation (2). All coefficients except DOM are significant and compatible with the baseline gravity model regression. The coefficient for DOM is positive but small and not statistically significant; the coefficient for DIFDOM is significant using SOLS and equal to !0.314, which implies that, all other things equal, two countries with different dominant religions trade 31 percent less. Finally, the SAMEDOM coefficient tells us that when two countries share the same dominant religion, then all other things equal they trade 38 percent less. These results suggest that the presence of a dominant religion has no institutional effect, or possibly a negative institutional effect, on trade. The negative SAMEDOM coefficient suggests that the network effects related to countries' sharing of religious institutions cause more trade diversion than trade creation.

THE TRADE IMPACT OF SPECIFIC RELIGIONS

The gravity model can be extended further to distinguish the impact of specific dominant religions on trade flows. By adding dummies for

specific dominant religions (DOM) and shared dominant religions (SAME), the regression model becomes:

$$
\begin{aligned}
(3) \qquad tot_{ij} = {} & a_0 + a_1(gdp_i gdp_j) + a_2(pop_i\, pop_j) + a_3 dist_{ij} \\
& + a_4 CONT_{ij} + a_5 LANG_{ij} + a_6 FTA_{ij} \\
& + a_7 LAW_{ij} + a_8(burden_{ij}) + a_9(cyber_i cyber_j) \\
& + a_{10}(phone_i phone_j) + a_{11}(DOMBuddhist) \\
& + a_{12}(DOMCatholic) + a_{13}(DOMHindu) \\
& + a_{14}(DOMJudaism) + a_{15}(DOMMuslim) \\
& + a_{16}(DOMProtestant) + a_{17}(SAMEBuddhist) \\
& + a_{18}(SAMECatholic) + a_{19}(SAMEHindu) \\
& + a_{20}(SAMEMuslim) + a_{21}(SAMEOrthodox) \\
& + a_{22}(SAMEProtestant) + u_{ij}.
\end{aligned}
$$

Estimation results for equation (3) are found in columns 4 and 7 in Table 1. The results indicate that when Catholic, Hindu, Judaism, Muslim, or Protestant religions are dominant, trade is reduced. The dominance of the Orthodox religion has an insignificantly positive institutional effect, and only Buddhism has a significantly positive institutional effect on trade. The network effects of individual religions are mostly insignificant. However, when countries share the Orthodox and Buddhist religions, trade is enhanced. Catholicism has a negative network effect.

CONCLUSIONS

Is religion compatible with globalization? The evidence from the regressions relating dominant religions and international trade suggests that dominant religion seems to have negative effect on trade. Focusing on individual religions reveals that most religions discourage trade. An exception is Buddhism, whose institutional and network effects both seem to encourage trade.

DATA APPENDIX

Bilateral trade data are from the International Monetary Fund's *Direction of Trade Statistics Yearbook*, 2000 (IMF, Washington, D.C.). Gross Domestic Product in millions of U.S. dollars, population, telephone lines per 1,000 people, free trade areas, and number of top domain internet hosts per 1,000 people are from the World Bank's 2001 *World Development Indicators* (World Bank, Washington D.C.). Distance (kilometers between capital cities) is from the *U.S. Geological Survey* (ftp://kai.er.usgs.gov/pub/). Common borders, common languages, and fraction of population claiming adherence to religions are from the *CIA World Factbook* 2000, (http://www.cia.gov/cia/publications/factbook/).

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