INTERNATIONAL TERRORISM, INTERNATIONAL TRADE, AND BORDERS

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This paper shows that terrorism reduces bilateral trade flows, in real terms, by raising trading costs and hardening borders. Countries sharing a common land border and suffering from terrorism trade much less than neighboring or distant countries that are free of terrorism. The impact of terrorism on bilateral trade declines as distance between trading partners increases. This result suggests that terrorism redirects some trade from close to more distant countries. Our findings are robust in the presence of a variety of other calamities such as natural disasters or financial crises.

Key Words: financial crisis; natural disaster; trade gravity model; transaction cost

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The *Oxford English Dictionary* defines terrorism as furthering one's views through acts of coercive intimidation. It is self evident that terrorists want to disrupt the economic and political process of a nation. Acts of terrorism are costly in that they require governments to incur immediately rescue, cleanup and reconstruction expenditures. In the longer term, terrorism raises anxiety and uncertainty in the community; this, in turn, adds to cost and prices of goods and services--e.g., the terrorist premium on crude oil prices--and reduces the propensity to invest in projects. Finally, terrorism prompts governments to set-up costly policies of counterterrorism.

There is some evidence that political instability depresses economic activities: for example, Alesina et al. (1996) find that economic growth slows down when government collapses and Barro (1991) uncovers a negative correlation between economic growth and political instability. As to the impact of terrorism on economic growth, the evidence appears more tenuous than the effect of political instability. To be sure, terrorism has had material economic consequences on specific areas of the world like the Basque country (Abadie & Gardeazabal, 2003) and Israel (Eckstein & Tsiddon, 2004) and on specific industries like tourism (Enders, Sandler & Parise, 1992), but these findings cannot be extended with equal force to panel studies involving a large sample of countries. Bloomberg et al. (2004), using data from 1968 to 2000 and 177 countries, detect a negative effect of terrorism on economic growth but find it to be economically less important than effects generated by either internal or external

conflicts. To similar conclusions arrives Tavares (2004) who finds that the adverse impact of terrorist attacks washes away when additional control variables are taken into consideration. In contrast, natural disasters, banking and currency crises leave a persistent mark on growth.

There is a sizable literature in political science on the relationship between conflict and international trade; see Reuveny (1999-2000) for a review. In some studies--such as those by Pollins (1989a, 1989b) and Bergeijk (1994)--conflict is an exogenous force that raises the cost of doing business and lowers the amount of trade flows. In other studies, such as Polachek's (1980), conflict is instead endogenous so that a nation chooses an optimal level of conflict in international political environments. As trade becomes more intense, the economic cost of conflict rises and the equilibrium level of conflict falls. Reuveny and Kang (1998) tackle the direction of causality between international trade and conflict and find a mixed pattern: conflict Granger causes trade in metals, petroleum, basic manufactured goods, and high technologies, but trade Granger causes conflict in food, beverages, and miscellaneous manufactured goods.

The interaction between international terrorism and international trade has received little attention in the literature so far. In Nitsch and Schumacher (2004), terrorism is exogenous and produces a downward shift in the intercept of a gravity equation applied to bilateral trade flows. The headline result in that paper is that a doubling in the number of terrorist incidents in a year decreases bilateral trade by about 4% in the same year. Li and Schaub (2004), on the other hand, ask the question whether terrorism responds to a rise in globalization and conclude that terrorist activity declines inasmuch as globalization promotes economic development.

This paper starts with the premise that international terrorism is, to a first approximation, exogenous to bilateral trade flows and investigates how changes in terrorism activity influences trade primarily through changes in trading costs. Our focus on trading costs and borders is one of strategy, without disputing that terrorism may have secondary effects taking place through changes in real income and/or cultural variables that typically enter the gravity equation.

The structure of the paper is as follows. We start with a discussion in Section 1 on how terrorism impacts trading costs and the thickness of borders. We then propose an empirical specification of such effects based on a gravity equation of bilateral trade flows in Section 2, and find statistically significant and economically important terrorism-induced increases in trading costs and hardening of the borders. The strength of our findings suggests policy implications as discussed in Section 3 on how best to handle border safety with a minimum impact on trade flows. Conclusions are drawn in Section 4.

1. Terrorism, Trading Costs, and Borders

A recent report of the *Economist* (August 20, 2005) reminds us that terrorism is not a new phenomenon. "Bombs, beards and fizzing fuses" are just as much the hallmark of today's Islamic inspired terrorism as of the revolutionary anarchism that swept Europe and the United States from 1870 to the start of World War I. In addition to numerous ordinary people, victims of the earlier movement included the President of France, the Empress of Austria, the King of Italy, the President of the United States, and two Spanish Prime Ministers. Unfortunately, such anarchical

terrorism was reduced not by effective policy measures to counter it, but rather by bigger events like World War I. Hoffman (1998) gives a more detailed history of terrorism emphasizing that its inspirations, through the centuries, have swung back and forth between religious, ethno-national and ideological motives. The recent revival of religious terror, according to Hoffman, stems from the breakdown of the post Soviet state and the failure to achieve reforms in Islamic countries in the wake of the Iranian revolution. Whatever the specific causes, religious terrorism is particularly pernicious because their foot soldiers are indoctrinated to believe that their acts of violence are a divine duty that free them from any moral constraints on behavior.

Terrorism creates anxiety and makes people become more guarded about the potential harm imbedded in any transaction, be it a home delivery of a package or air travel. Counterterrorist policies tend to exacerbate the impact of terrorism on trading costs. To detect potentially harmful cross-border transactions, flows of people and goods must be subject to costly inspection and monitoring. This translates into a reduction of total factor productivity and real income. While all transactions are subject to this cost, cross-border transactions receive special attention, based either on evidence or the assumption that lethal components are more likely to be imbedded in foreign goods or in foreign people than in domestic ones. This was certainly the reaction of the U.S. government following the destruction of the twin towers on September 11, 2001: the national border was completely shut down for hours and subsequently was made much less permeable for “terrorists, weapons of mass destruction, illegal migrants, contraband, and other unlawful commodities” (White House, 2002). Qualitatively similar

reactions took place in member countries of the European Union, which created an anti-terrorist coordinating position; see *Financial Times* (August 1, 2005).

Direct evidence that less permeable borders slows down cross-border traffic can be gleaned from newspaper accounts on the impact of tighter U.S. visa requirements on migration flows. The *Financial Times* of June 2, 2004 reports that "…nearly three-quarters of [surveyed] companies had experienced unexpected delays or arbitrary denials of business visa, while 60% said that the delays had hurt their companies through increased costs or lost sales." Coordination in border policies is likely to be imperfect at best, leading to differences in degrees of border permeability and trading costs. Furthermore, countries may use such differences to obtain a competitive advantage. According to a survey conducted by the Council of Graduate Schools, foreign applications to U.S. colleges and universities fell 32% during the last reporting period over the previous one; for Chinese graduate applications the drop was 76% (*Financial Times* April 29, 2004). In contrast, foreign applications have been rising in Australia, Canada, and the United Kingdom. U.S. Secretary of State Colin Powell is reported as saying "that international scientific exchanges and conferences in the U.S. have become almost impossible to organize because of the new restrictions…This hurts us. It is not serving our interests. And so we really do have to work on it" (*Financial Times*, April 23, 2004).

Not surprisingly, U.S. universities have been pressing the Department of Homeland Security to review border procedures for foreign students.

2. Testing for Trading Costs and Border Effects

The gravity equation has had considerable success in explaining bilateral trade flows in terms of income, population, distance as a proxy of trading costs, and country characteristics; for a review see Fratianni (chapter 2, this volume). A stylized representation of this equation is given by (1):

$$(1) \qquad \ln(x_{ijt}) = \alpha_0 + \alpha_1 \ln(y_i y_j)_t + \alpha_2 \ln(I_i I_j)_t + \alpha_3 \ln(D_{ij}) + \alpha_4 B_{ij} + \alpha_5 F_{ij} + \varepsilon_{ijt},$$

where x_{ijt} = real bilateral trade between country i and country j at time t; y = real gross domestic product; I = per capita real GDP; D_{ij} is distance between i and j; B_{ij} is a dummy variable that is equal to one when the country pair i and j have a common land border, otherwise is zero; F_{ij} is a vector of other time-invariant factors that include, among others, common language, common colonial ties, and common institutions; and ε_{ijt} is a disturbance term. Bilateral trading costs, τ_{ij}, are unobservable and are posited to be related to distance by the relationship $\tau_{ij} = D_{ij}^{\alpha_3}$, where α_3 is the elasticity of bilateral trade with respect to distance. National borders create a discontinuity in distance and, thus, a jump in transaction and regime costs. These costs are driven by differences in legal systems and practices, languages, networks, competitive policies, monetary regimes, and tariffs or tariff-equivalent restrictions; like transportation, these costs show up by creating a wedge between the price paid by consumers in the importing country and the exporter's net supply price.

Terrorism and counterterrorism policies raise trading costs and border thickness. To the extent that terrorism works like crime, we should expect its impact to be greater for close neighborhoods and become progressively weaker as trading partners are separated farther away. In essence, terrorism-related trading costs ought to decline, other factors being equal, with distance. Terrorism also hardens national borders and, consequently, widens the price wedge and creates a mixture of substitution of home transactions for cross-border transactions and "trade diversion". To see these effects, assume that the world consists of Canada, Mexico, and the United States, and that the United States hardens its border with Mexico, but not with Canada. Also assume that the higher bilateral border barrier raises Mexican import price from the United States and vice versa. U.S. exporters would substitute the home market for the Mexican market. On the other hand, assuming substitutability between Canadian and U.S. goods in Mexico, U.S. exports to Mexico would be partly replaced by Canadian exports. Similar considerations would hold for Mexican exports to the United States. The harder bilateral border would generate a mixture of substitution of home transactions for cross-border transactions, and trade diversion from country pairs with harder borders to country pairs with softer borders. This is essentially the implication of Anderson and van Wincoop (2003), whose gravity model responds not only to bilateral trading costs, but also to "multilateral resistance" factors that depend on all bilateral trading costs. In sum, a hardening of the border will reduce and redirect cross-border trade unless a policy-driven liberalization can compensate for the higher trading costs.

To test for the effects of terrorism on bilateral trade flows, we treat Equation (1) as being subject to an omitted variable problem, namely terrorism. This variable enters the gravity equation as an additional intercept shift parameter so that the overall level can change and also as a dummy variable interacting with both distance and common-land border countries. The estimate of the level shift parameter will give us a measure of the reduction in bilateral trade flows due to terrorism holding all the factors in the model constant. The estimate of the interacting dummy variable with distance will give us a measure of the impact of terrorism on trading costs. These trading costs are expected to decline as countries are farther apart. Terrorism severely hits neighboring countries, which are empirically defined as those sharing a common land border. The estimate of the interacting dummy variable with common land border countries will give us an estimate of the "costs" of the hardening of the border on trade. With these considerations, we modify Equation (1) as follows:

$$(2) \quad \ln(x_{ijt}) = \alpha_0 + \alpha_1 \ln(y_i y_j)_t + \alpha_2 \ln(I_i I_j)_t + \alpha_3 \ln(D_{ij}) + \alpha_4 B_{ij} + \alpha_5 F_{ij} + \alpha_6 T_{ijt} + \alpha_7 T_{ijt} \ln(D_{ij}) + \alpha_8 T_{ijt} B_{ijt} + \varepsilon_{ijt},$$

where T stands for terrorism and is measured by binary variables; see below. The expected values of the coefficients are as follows: α_1, α_2 , α_4, and α_7 are positive; α_3, α_6, and α_8 are negative; and α_5 can be either positive or negative depending on whether cultural and institutional variables are trade enhancing or trade contracting. We will also test whether the effects of terrorism on trade are robust in the presence of other calamities such as natural

disasters, technological disasters, and banking and currency crises. In addition, we test the robustness when the quality of national institutions is also controlled for.

2.1 Data

Table 1 reports a few descriptive statistics of bilateral trade flows and explanatory variables for Equation (2) using a large sample of 97,803 country-pair observations over the period 1980-1999. The description of the data underlying the benchmark gravity Equation (1) can be found in the Technical Appendix at the end of the volume. When natural and technological disasters are added, the number of observations reduces to 96,804. Due to the limited coverage of other data sources, the number of observations further reduces to 62,949 and then to 23,224, respectively, as we add institutional quality variable and then banking and currency crises. For each data set, we report the mean, standard deviation, minimum, and maximum of our dependent variable, real trade flows. The mean real trade flow increases from 218 million dollars to 220 million dollars, and then to 282 million dollars. When banking and currency crises are added, the mean real trade flow is 724 million dollars, indicating that banking and currency crisis data are only obtained among rather large countries. Except for the banking and currency crisis data, the coverage and the characteristic of other economic data are about the same; the sample size gets reduced from 97,803 to 62,949. Here, we discuss the measurement of terrorism, natural disasters, technological disasters, banking crises and currency crises.

[Insert Table 1 here]

For international terrorism, we have used the International Terrorism Attributes of Terrorist Events databank (ITERATE) from Mickolus et al. (2003); see Sandler and Enders (2004) for a general assessment of this database. ITERATE collects event counts, except for number of casualties, and has been widely used in economics and political science; see, for example, Atkinson, Sandler, and Tschirhart (1987); Cauley and Im (1988); Bloomberg et al. (2004); Li and Schaub (2004); and Nitsch and Schumacher (2004). Our terrorism variables are "BothT" = 1 when both trading partner countries have experienced an act of terrorism, otherwise 0; and "OnlyoneT" = 1 when only one of the two countries in the pair has experienced an act of terrorism, otherwise 0.

For disasters, we have employed the Emergency Events Database (EM-DAT) from the Centre for Research on the Epidemiology of Disaster at Université Catholique de Louvain in Belgium. EM-DAT collects 13 types of natural disasters and three types of technological disasters.[1] OECD (1994) assesses that EM-DAT is the closest approximation to a global hazard and disaster database. Like ITERATE, EM-DAT is widely cited in disaster research and in economics and political science; see, for example, Skidmore and Toya (2002); Auffret (2003); and Tavares (2004). Like terrorism, natural disasters and technological disasters are defined as a binary variable, using the same scheme as terrorism.[2] The reason for a binary variable rather than a cardinal variable, like number of people killed in a disaster, is justified by the incentive that developing countries may have in exaggerating reports of calamities to secure international assistance (Albala-Bertrand, 1993).

For the quality of institutions, we have used the political risk index compiled by the International Country Risk Guide (ICRG) created and maintained by Political Risk Services. The index measures 12 different aspects of institutional quality, ranging from government stability to democratic accountability.[3] The ICRG database has been used in important studies such as Hall and Jones' (1999) research on the link between labor productivity and social infrastructure and La Porta et al. (1998) on legal protection of investors. Our measure of institutional quality for the country pair is the logarithm of the sum of the two countries' scores.

For currency and banking crises, we have relied on the compilation by Bordo et al. (2001) of the original data source of IMF (1998), which has been frequently cited in research on financial crises; see, for example, Tavares (2004). Our measure of banking crises and currency crises are binary variables, using the same scheme of terrorism.[4]

2.2 Empirical Findings

We start with a discussion of Nitsch and Schumacher (2004). In column 2 of Table 2, we report the authors' original estimates of the gravity equation when terrorism is defined as the sum of "the (additively linked) dummy of at least one terrorist action" (p. 429). The sum of the two dummies is a trinary variable defined as 0 when neither country suffers from terrorism, 1 when one country suffers from terrorism, and 2 when both countries suffer from terrorism. We refer to this as "Sum Terrorism Dummy". It should be noted that although Nitsch and Schumacher use the term, dummy variable, to indicate it: it is a trinary, not a binary dummy, variable. Use of the

trinary variable assumes that the impact of terrorism when both countries suffer from terrorism would be twice as large as the effect when only one country suffers from it.

[Insert Table 2 here]

Moreover, Nitsch and Schumacher restrict their sample period to the years 1968-1979, apparently because they use terrorism data from Mickolus (1980), even though the electronic-based ITERATE goes well beyond 1979. The salient result in Nitsch and Schumacher is that the "Sum Terrorism Dummy" has a statistically significant negative coefficient and an economic impact of reducing bilateral trade by almost 10% if one country is affected by terrorism and 20% if both countries are affected by it.[5] The "Sum Terrorism Dummy" variable is reported as being significant at the 1% level. We reproduced the Nitsch and Schumacher experiment for the period 1980-1999, by using the same "Sum Terrorism Dummy" variable and found that the statistical significance of the trend disappears; see column 3 of the table. In fact, the variable is no longer significant even at the 10% level. The trinary variable remains statistically insignificant even with our specification of the gravity equation; see last column. The results in the last column are very similar to those in the literature, where common RTA and inter-regional variables are added in addition to the variables in Nitsch and Schumacher. In sum, the impact of the terrorism discovered by Nitsch and Schumacher appears to be sample specific and evident only when the terrorism is measured in this particular, unconventional way. We found it unproductive to pursue this line of inquiry further. Instead, we use two separate dummy variables for terrorism and we include their interaction terms with both distance and common borders.

Table 3 shows results on terrorism, distance and border based on Equation (2). In column 2 of Table 3, terrorism enters the equation only as a level (or intercept term) shift parameter; in column 3 it also interacts with distance; and in column 4, it also interacts with common land borders. All the coefficient estimates of the six terrorist variables are statistically significant at least at the 10% level and have the expected sign. The interaction between terrorism and common land borders is economically strong, stronger than the level shift parameter. Pairs of countries in which both partners suffer from terrorism trade 62% less than country pairs not subject to terrorism; pairs in which only one country suffers from terrorism trade 41% less than country pairs not subject to terrorism. The level effect of terrorism on all bilateral trade implies a reduction of 25% in bilateral trade flows when both countries experience terrorism and 32% when only one country experiences terrorism.[6]

[Insert Table 3 here]

Terrorism-related trading costs decline as distance between trade partners increases. For example, the elasticity of real bilateral trade flows with respect to distance for both countries experiencing terrorism is -1.035 against an elasticity of -1.08 for countries not subject to terrorism. The numerically smaller elasticity of terrorism-prone countries partially offsets the negative impact of terrorism working through the level shift parameter. The differential elasticities also corroborate the proposition that terrorism has differentiated location effects. The interaction of terrorism with common border shows that the impact of terrorism for non-neighboring countries also works in the opposite direction of the level shift parameter. To see

more clearly how terrorism interacts with distance and border, we have selected three pairs of trading partners, which all have experienced terrorism in the same year in the sample. Israel and Jordan share a common land border; Pakistan and Tunisia are separated by about the average distance in the sample (3,527 miles), and Ecuador and Singapore have the greatest distance in the sample (12,320 miles). The Impact of terrorism -- measured by the level shift parameter, the terrorism dummy interacting with distance, and the terrorism dummy interacting with common border-- reduces the logarithm of real bilateral trade flows by 9.4% between neighboring Israel and Jordan, but only by 0.022% between Pakistan and Tunisia at the average distance; on the other hand, terrorism actually raises the logarithm of bilateral trade by 0.41% between the very distant Ecuador and Singapore. For this last pair of countries, the positive border interaction effects more than offsets the negative impact working through the level shift parameter; see Table 4. These patterns are consistent with terrorism redistributing trade flows from close to distant countries.

[Insert Table 4 here]

The above findings appear to be robust in the presence of other calamities, such as natural and technological disasters, the quality of national institutions, and banking and currency crises; see Table 5. Natural disasters, in contrast to terrorism, have statistically negative effects across all countries but positive ones for neighboring countries. Technological disasters, on the other hand, have a statistically positive level effect but a negative one for common border countries. This pattern may reflect different responses by neighboring countries to different

kinds of disasters. Natural disasters may prompt neighbors to embark on cooperative strategies that enhance bilateral trade flows. Technological disasters may instead spark protectionist responses that reduce trade flows. The estimated coefficients of the banking and currency crises dummy variables are either statistically insignificant or positive. It should be noted that banking and currency crises are much less numerous than other calamities and the characteristics of the sample are different from those without them as shown in Table 1, a possible reason for the odd result in the estimation. Institutional quality has a strong positive intercept impact on bilateral trade flows but a negative one for neighboring countries; this too is counter to our expectation. In sum, a few unexplainable aspects notwithstanding, the salient aspect of Table 5 is that the addition of other calamities does not alter the statistical and economic significance of terrorism on bilateral trade flows.

[Insert Table 5 here]

We report the economic significance of terrorism on trade in Table 6. Column 1 shows the estimates of the coefficients, reported in column 4 of Table 3, multiplied by the (sample) mean value of the corresponding variables of the simple specification of the gravity equation. The predicted value of the log of bilateral trade without any terrorism is 12.0828. Column 2 shows the prediction of a specification when terrorism is added to the previous column under a scenario that both trading partners suffer from terrorism. The predicted log bilateral trade is 11.1125. The terrorism accounts for a reduction of 8.03% in the logarithm of bilateral trade flows predicted when terrorism is excluded; call it the marginal impact of terrorism. With a

similar procedure, we compute the marginal impact of disasters (columns 3 and 4) and institutional quality (columns 5 and 6). Disasters, conditional on terrorism and institutional quality, reduce the predicted logarithm of bilateral trade by 2.87%. A one standard deviation decline in institutional quality, conditional on terrorism, disasters, and institutional quality, reduce the logarithm of bilateral trade by 0.9%. In sum, the exercise confirms the economic importance of terrorism against the background of disasters and quality of institutions. The impact of terrorism is by far larger than the impact of other disasters and crises. The trading partners sharing common land borders and terrorism activities have an extra burden of higher transaction costs which reduce their trade, in logarithmic terms, by 8%.

[Insert Table 6 here]

3. Implications of Border Policy

We have seen that terrorism exerts a large negative impact on trade by raising trading costs. By hardening borders, especially between neighboring trading partners, terrorism contributes to higher trading costs and to the subsequent substitution of home trade for cross-border trade. These effects are likely to be much higher for small and open economies than for large and relatively closed economies. Another adjustment resulting from the hardening of the borders comes from the redistribution of trade from country pairs with higher trading costs to country pairs with lower trading costs. Our evidence shows that terrorism redistributes and diverts trade from neighboring to distant countries suffering from terrorism. Trade redistribution and

diversion are likely to be much more widespread when countries adopt different border policies, with soft-barrier countries gaining trade at the expense of hard-barrier countries.

The negative consequences of harder border policies could be partially offset by cooperative arrangements. Neighboring countries tend to trade more than distant countries and have more to lose by not cooperating. As an example, the United States has long land borders with both Canada and Mexico. Canada is the most important trading partner of the United States and Mexico is the third. Failure to cooperate on common border policies would induce substitution of home for cross-border transactions. Since these substitutions would be deeper in Mexico and Canada than in the United States, Canada and Mexico would have a greater incentive to follow U.S. border policy than the United States to follow either Canadian or Mexican border policies. Similarly, in the European Union the large member countries have incentives to set their own harder border policies and the small ones have incentives to follow those policies.

Cooperative arrangements on border policy may actually accelerate the process of regional deepening, as evidenced from our results (see Table 3). Regional trade agreements with homogeneous countries and preferences would be the fastest in implementing such a perimeter. Customs unions would face lower coordinating costs than free trade associations. In sum, security concerns would make the world less global and hence more regional.

4. Conclusions

The main thesis of this paper is that terrorism exerts a negative impact on bilateral trade flows by raising trading costs and hardening borders. The evidence marshaled in this paper indicates that neighboring countries suffering from terrorism trade considerably less than countries not subject to it. As distance increases between countries, the impact of terrorism declines. That is, the elasticity of bilateral trade with respect to distance declines for terrorism-affected countries, suggesting that some trade is redirected from close to more distant countries as a result of terrorism. The positive impact working through distance tends to offset the negative impact working through the level shift parameter. These findings are robust in the presence of natural disasters, technological disasters, the quality of national institutions, banking crises, and currency crises.

The economic consequences of safer borders are likely to hit hardest small and open economies and to increase the home bias of international trade. It will also divert cross-border trade towards countries with smaller border restrictions. In an attempt to minimize the cost of hardened borders, some regional trade agreements may experiment with common security perimeters. This, in turn, will lead to a deeper regional trade bias.

Endnotes

1 Natural disasters include droughts, earthquakes, extreme temperatures, famines, floods, slides, volcanic eruptions, waves/surges, wild fires, wind storms, epidemics, and insect infestations. Technological disasters include industrial, transport, and miscellaneous accidents. See http://www.em-dat.net/ for definitions and data.

2 BothNat and OnlyoneNat denote, respectively, both countries and only one country in the pair experiencing natural disasters. BothTech and OnlyoneTech have similar meanings for technological disasters.

3 The complete list includes government stability (12% weight), socioeconomic conditions (12%), investment profile (12%), internal conflict (12%), external conflict (12%), corruption (6%), military in politics (6%), religion in politics (6%), law and order (6%), ethnic tensions (6%), democratic accountability (6%), and bureaucratic quality (4%).

4 BothBank and OnlyoneBank denote, respectively, both countries and only one country in the pair experiencing a banking crisis. BothCurr and OnlyoneCurr are the corresponding variables for currency crises.

5 We ignore the authors' estimates when terrorism is defined as log(1+ number of terrorist actions), which give rise to the headline result that a doubling of terrorist attacks is associated with a 4% decline in bilateral trade.

6 The exponentiation of -.9699, -.5306, -.287, and -.377 are respectively 0.38, 0.59, and 0.75 and 0.68.

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Table 1. Summary Statistics

Variable	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
Real Trade Flow[1]	97,803	2,180,700	1.75E+07	0.00015	1.09E+09
Log (real Trade Flow)	97,803	10.7692	3.0379	-8.8161	20.8112
Log of real GDP[1]	97,803	48.8429	2.5088	38.6652	59.0900
Log (real per capita GDP)[1]	97,803	16.4559	1.5084	9.90 05	21.3783
Log (distance)[2]	97,803	8.2135	0.7692	4.0168	9.4215
Common Border	97,803	0.0244	0.1543	0	1
Common language	97,803	0.2105	0.4077	0	1
Common country	97,803	0.0003	0.0166	0	1
Common colonizer	97,803	0.0821	0.2745	0	1
Colonial relationship	97,803	0.0212	0.1441	0	1
Common currency	97,803	0.0069	0.0827	0	1
Common RTA	97,803	0.0222	0.1473	0	1
Inter-regional	97,803	0.1204	0.3254	0	1
Sum Terrorism	97,803	1.0174	0.7032	0	2
Both Terror	97,803	0.2561	0.4365	0	1
BothT log (distance)*	97,803	2.0923	3.5905	0	9.419
BothT Border*	97,803	0.0090	0.0944	0	1

Only One Terror	97,803	0.5052	0.5000	0	1
*OnlyoneT*log(distance)*	97,803	4.1632	4.1519	0	9.4215
*OnlyoneT*Border*	97,803	0.0091	0.0949	0	1
Both Natural Disaster	96,864	0.3452	0.4754	0	1
BothNat log (distance)*	96,864	2.8736	3.9826	0	9.4215
BothNat Border*	96,864	0.0112	0.1051	0	1
Only One Natural Disaster	96,864	0.4831	0.4997	0	1
*OnlyoneNat*log(distance)*	96,864	3.9764	4.1447	0	9.4215
*OnlyoneNat*Border*	96,864	0.0087	0.0929	0	1
Both Technological Disaster	96,864	0.1730	0.3783	0	1
BothTech log (distance)*	96,864	1.4365	3.1554	0	9.4215
BothTech Border*	96,864	0.0057	0.0754	0	1
Only One Tech. Disaster	96,864	0.4807	0.4996	0	1
*OnlyoneTech*log(distance)*	96,864	3.9721	4.1603	0	9.4215
*OnlyoneTech*Border*	96,864	0.0099	0.0992	0	1
Real Trade Flow	96,864	2,197,638	1.76E+07	0.00015	1.09E+09
Institutional Quality	62,949	4.8434	0.1847	3.6636	5.2470
*IQ*log(distance)*	62,949	39.8351	4.0779	18.45768	48.91247
*IQ*Border*	62,949	0.1174	0.7419	0	5.2257
Real Trade Flow	62,949	2,819,222	2.08E+07	0.00015	1.09E+09
Both Banking Crisis	23,224	0.0035	0.0593	0	1
BothBank log (distance)*	23,224	0.0288	0.4867	0	9.3912
BothBank Border*	23,224	0.0003	0.0174	0	1

Only One Banking Crisis	23,224	0.1082	0.3106	0	1
*OnlyoneBank*log(distance)*	23,224	0.9161	2.6411	0	9.4190
*OnlyoneBank*Border*	23,224	0.0033	0.0571	0	1
Both Currency Crisis	23,224	0.0065	0.0806	0	1
BothBank log (distance)*	23,224	0.0560	0.6927	0	9.4190
BothBank Border*	23,224	0.0002	0.0147	0	1
Only One Currency Crisis	23,224	0.1629	0.3693	0	1
*OnlyoneCurr*log(distance)*	23,224	1.3790	3.1404	0	9.4190
*OnlyoneCurr*Border*	23,224	0.0050	0.0702	0	1
Real Trade Flow	23,224	7,243,371	3.33E+07	0.00883	1.02E+09

Notes: [1]Real trade flows are in hundreds of U.S. dollars. Real GDP and real per capita GDP are expressed in U.S. dollar. The base year of real trade flows, real GDP, and real per capita GDP is 1982-1984.
[2] The unit of distance is the mile.

Table 2. Nitsch and Schumacher (2004)

	Nitsch & Schumacher		*Our Equation*
Variable	*(1968-1979)*	*(1980-1999)*	*(1980-1999)*
intercept	Not Reported	-28.9905***	-29.1546***
		(0.1366)	(0.1375)
Log of real GDP	0.800***	0.8383***	0.8396***
	(0.004)	(0.0026)	(0.0026)
Log of real per capita GDP	0.550***	0.4979***	0.4820***
	(0.006)	(0.0043)	(0.0044)
Log of distance	-1.053***	-1.0940***	-1.0506***
	(0.010)	(0.0077)	(0.0081)
Common Border	0.361***	0.4565***	0.3663***
	(0.047)	(0.0384)	(0.0381)
Common language	0.312***	0.4242***	0.3835***
	(0.020)	(0.0147)	(0.0146)

Common country	1.221***	0.6892**	0.5655**
	(0.280)	(0.3186)	(0.2747)
Common colonizer	0.783***	0.6317***	0.5916***
	(0.031)	(0.0249)	(0.0249)
Colonial relationship	1.795***	1.3528***	1.3572***
	(0.044)	(0.0285)	(0.0285)
Common currency			0.9513***
			(0.0742)
Common RTA			0.9241***
			(0.0359)
Inter-regional			0.1729***
			(0.0153)
Time Fixed Dummies	Estimated but not reported here		
Sum Terrorism Dummy	-0.098***	-0.0081	-0.0130
	(0.018)	(0.0088)	(0.0088)
Obs.	59,780	97,803	97,803
R^2	0.63	0.6823	0.6850
Test Statistics			F(3, 97772) = 304.60
Additional variables are jointly 0			Prob > F = 0.0000

Notes: Robust standard errors are shown in parentheses. Statistical significance at the 1% level is indicated by ***, at the 5% by **, and the 10% by *.

Table 3. Distance, Border and Terrorism

Variable	*With Terrorism Variable*	*With Distance Interaction*	*Distance and Border Interaction*
intercept	-29.1202***	-28.5576***	-28.9563***
	(0.1380)	(0.1765)	(0.1854)
Log of real GDP	0.8394***	0.8396***	0.8394***
	(0.0026)	(0.0026)	(0.0026)
Log of real per capita GDP	0.4819***	0.4838***	0.4843***
	(0.0044)	(0.0044)	(0.0044)
Log of distance	-1.0504***	-1.1240***	-1.0770***
	(0.0081)	(0.0160)	(0.0173)
Common Border	0.3622***	0.3654***	0.9167***
	(0.0381)	(0.0379)	(0.0801)
Common language	0.3837***	0.3860***	0.3893***
	(0.0146)	(0.0146)	(0.0146)

Common country	0.5825**	0.5869**	0.5910**
	(0.2748)	(0.2761)	(0.2772)
Common colonizer	0.5879***	0.5823***	0.5819***
	(0.0250)	(0.0249)	(0.0249)
Colonial relationship	1.3612***	1.3604***	1.3599***
	(0.0286)	(0.0286)	(0.0284)
Common currency	0.9488***	0.9022***	0.8688***
	(0.0741)	(0.0745)	(0.0739)
Common RTA	0.9169***	0.9229***	0.9455***
	(0.0359)	(0.0359)	(0.0360)
Inter-regional	0.1728***	0.1686***	0.1660***
	(0.0153)	(0.0153)	(0.0153)
Time Fixed Dummies	Estimated but not reported here		
Both Terrorism	-0.0284	-1.0109***	-0.2870*
	(0.0178)	(0.1572)	(0.1730)
Only One Terrorism	-0.0581***	-0.7597***	-0.3770**
	(0.0154)	(0.1538)	(0.1686)
*BothT*log(distance)*		0.1198***	0.0349*
		(0.0192)	(0.0210)
*OnlyoneT*log(distance)*		0.0854***	0.0405**
		(0.0187)	(0.0203)
*BothT*Border*			-0.9699***
			(0.0966)
*OnlyoneT*Border*			-0.5306***
			(0.1010)
Obs.	97,803	97,803	97,803
R^2	0.6851	0.6852	0.6855
Test Statistics	F(2, 97770) = 8.30	F(4, 97768) = 13.65	F(6, 97766) = 27.51
Additional variables are jointly 0	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000

Table 4. Impact of Terrorism on Selected Pairs of Countries

		Both countries in the pair experience terrorism			
Variable	*Table 3 Column 4*	*Common Border Countries*	*Israel- Jordan: a common land border pair*	*Pakistan-Tunisia: mean distance pair*	*Ecuador-Singapore: maximum distance pair*
intercept	-28.9563	-28.9563	-28.9563	-28.9563	-28.9563
Log of real GDP	0.8394	42.3377	40.4077	41.5799	40.3134
Log of real per capita GDP	0.4843	8.0828	8.3422	7.3395	8.3134
Log of distance	-1.0770	-6.7811	-4.7383	-8.7973	-10.1443

Common Border	0.9167	0.9167	0.9167	0	0
Common language	0.3893	0.3893	0.3893	0	0
Common country	0.5910	0	0	0	0
Common colonizer	0.5819	0	0.5819	0	0
Colonial relationship	1.3599	0	0	0	0
Common currency	0.8688	0	0	0	0
Common RTA	0.9455	0	0	0	0
Inter-regional	0.1660	0	0	0	0.1660
Effects excluding terrorism[1]	(1)	12.6446	16.9432	11.1658	9.6922
Both Terrorism	-0.2870	-0.2870	-0.2870	-0.2780	-0.2870
*BothT*log(distance)*	0.0349	0.2197	0.1535	0.2851	0.3287
*BothT*Border*	-0.9699	-0.9699	-0.9699	0	0
Terrorism effects[1]	(2)	-1.0372	-1.1034	-0.0019	0.0417
Sum of all effects[1]	(3) = (1)+(2)	109,913	7,571,052	70,536	16,881
Actual log of real bilateral trade[1]	(4)	14.6065	11.7381	8.5260	10.2057
Impact of terrorism as a percent of predicted values	(2)/(3)	-8.9%	-6.1%	-0.017%	0.43%
Impact of terrorism as a percent of actual values	(2)/(4)	-8.9%	-9.4%	-0.022%	0.41%

[1]Units are in hundreds of dollars.

Table 5. Terrorism, Disasters, Institutional Quality, and Financial Crises

Variable	*Terrorism, Disasters and Institutional Quality*		*Terrorism, Disasters, Institutional Quality, and Financial Crises*	
intercept	-31.1913***	-39.2143***	-34.3366***	-41.9867***
	(0.2342)	(0.3189)	(0.4369)	(0.5454)
Log of real GDP	0.8497***	0.8502***	0.8486***	0.8523***
	(0.0033)	(0.0040)	(0.0048)	(0.0058)
Log of real per capita GDP	0.4921***	0.3352***	0.7555***	0.5472***
	(0.0054)	(0.0071)	(0.0096)	(0.0145)

Log of distance	-0.9751***	-0.9716***	-1.0687***	-1.0604***
	(0.0218)	(0.0217)	(0.0414)	(0.3977)
Common Border	1.1582***	9.0211***	0.5899***	8.5814***
	(0.1037)	(0.8995)	(0.1684)	(1.4592)
Common language	0.3947***	0.4037***	0.5297***	0.5522***
	(0.0175)	(0.0173)	(0.0239)	(0.0238)
Common country	NA	NA	NA	NA
Common colonizer	0.5434***	0.6453***	0.7596***	0.9078***
	(0.0325)	(0.0325)	(0.0744)	(0.0746)
Colonial relationship	1.1614***	1.1297***	0.5795***	0.5776***
	(0.0356)	(0.0341)	(0.0426)	(0.0414)
Common currency	0.9469***	0.8617***	NA	NA
	(0.1218)	(0.1135)		
Common RTA	0.5929***	0.5895***	0.2254***	0.2541***
	(0.0412)	(0.0399)	(0.0396)	(0.0384)
Inter-regional	0.1445***	0.1464***	0.0814***	0.0881***
	(0.0172)	(0.0169)	(0.0208)	(0.0204)
Time Fixed Dummies		Estimated but not reported here		
Both Terrorism	0.9123***	1.0099***	-1.2763***	-1.3606***
	(0.2133)	(0.2119)	(0.3747)	(0.3592)
Only One Terrorism	0.2149	0.3759*	-0.9409**	-0.9743***
	(0.2116)	(0.2094)	(0.3884)	(0.3714)
*BothT*log(distance)*	-0.1106***	-0.1085***	0.1199***	0.1396***
	(0.0258)	(0.0256)	(0.0443)	(0.0425)
*OnlyoneT*log(distance)*	-0.0285	-0.0410	0.0920**	0.1015**
	(0.0255)	(0.0252)	(0.0458)	(0.0438)
*BothT*Border*	-1.2505***	-1.1416***	-0.8450***	-0.8149***
	(0.1189)	(0.1155)	(0.1787)	(0.1642)
*OnlyoneT*Border*	-0.7764***	-0.7075***	-0.3901***	-0.3828**
	(0.1276)	(0.1211)	(0.1966)	(0.1774)
Both Natural Disaster		-0.0991***		-0.2738***
		(0.0237)		(0.0375)
Only One Natural Disaster		-0.0517**		-0.1974***
		(0.0212)		(0.0343)
*BothNat*Border*		0.1971*		0.4401***
		(0.1156)		(0.1258)
*OnlyoneNat*Border*		0.0076		0.4838***
		(0.1127)		(0.1274)
Both Tech .Disaster		0.0213		0.1194***
		(0.0225)		(0.0333)

Only One Tech .Disaster		-0.0003		0.0403
		(0.0178)		(0.0281)
*BothTech*Border*		-0.4303***		-0.3389***
		(0.1179)		(0.1265)
*OnlyoneTech*Border*		-0.2186**		-0.0267
		(0.1002)		(0.1151)
Institutional Quality		2.1328***		2.2525***
		(0.0586)		(0.1084)
*IQ*Border*		-1.6174***		-1.6759***
		(0.1814)		(0.2836)
Both Banking Crisis				0.3297
				(0.2299)
Only One Banking Crisis				0.1544***
				(0.0398)
*BothBank*Border*				-0.3612
				(0.4410)
*OnlyOneBank*Border*				0.0240
				(0.1550)
Both Currency Crisis				0.0674
				(0.1502)
Only One Currency Crisis				-0.0467
				(0.0337)
*BothCurr*Border*				1.4172**
				(0.6757)
*OnlyOneCurr*Border*				0.1491
				(0.1332)
Obs.	62,233	62,233	17,829	17,829
R^2	0.7043	0.7118	0.7964	0.8041
Test Statistics		F(10, 62191) = 138.59		F(8, 17781) = 3.73
Additional variables are jointly 0		Prob > F = 0.0000		Prob > F = 0.0002

See notes to Table 2.

Table 6. Marginal Economic Significance of Terrorism, Disasters, and Institutional Quality

Variable	*Both countries had terrorism activities (Table3 Column4)*		*Both countries had natural disaster and tech. disaster (Table5 Column3)*		*Decreasing unit standard deviation of Institutional Quality (Table5 Column3)*	
Intercept	-28.9563	-28.9563	-39.2143	-39.2143	-39.2143	-39.2143
Log of real GDP	40.9987	40.9987	42.0203	42.0203	42.0203	42.0203
Log of real per capita GDP	7.9696	7.9696	5.5424	5.5424	5.5424	5.5424

Log of distance	-8.8459	-8.8459	-7.9940	-7.9940	-7.9940	-7.9940
Common Border	0.9167	0.9167	9.0211	9.0211	9.0211	9.0211
Both Terrorism		-0.2870	1.0099	1.0099	1.0099	1.0099
*BothT*log(distance)*		0.2867	-0.8927	-0.8927	-0.8927	-0.8927
*Both T*Border*		-0.9699	-1.1416	-1.1416	-1.1416	-1.1416
Both Natural Disaster				-0.0991	-0.0991	-0.0991
*BothNat*Border*				0.1971	0.1971	0.1971
Both Tech. Disaster				0.0213[x]	0.0213[x]	0.0213[x]
*BothTech*Border*				-0.4303	-0.4303	-0.4303
Institutional Quality			10.3304	10.3304	10.3304	9.9363
*IQ*border*			-7.8340	-7.8340	-7.8340	-7.5351
Predicted value of Log of Bilateral Trade	12.0828	11.1125	10.8474	10.5364	10.5364	10.4412
Marginal impact as a per cent of predicted value		-8.03		-2.87		-0.90
Number of Observation	97,803	97,803	62,233	62,233	62,233	62,233

Notes: [x]statistically insignificant. Effects are calculated as coefficients multiplied by mean values. For example, the coefficient and the mean value of log of real GDP in table 3 is 0.8394 and 48.8429, respectively. Therefore, the effect is 40.9987 (=0.8394 * 48.8429). Mean values are obtained from each sample. For instance, the mean value of log of real GDP in column 3 of table 5 is 49.4240. We do not report each sample mean value here. Decreasing institutional quality is defined by a reduction of one standard deviation of institutional quality. Marginal impact measures the difference in the predicted value of the equation estimated with the variables indicated in the column relative to the prediction of the equation without those variables. For example -8.03 = (11.1125/12.0828 – 1)*100.