11-1-2006

How Much Does Violence Tax Trade?

S. Brock Blomberg
Claremont McKenna College

Gregory Hess
Claremont McKenna College

HOW MUCH DOES VIOLENCE TAX TRADE?

S. Brock Blomberg and Gregory D. Hess*

Abstract—We investigate the empirical effect of violence, as compared to other trade impediments, on trade flows. Our analysis is based on a panel data set with annual observations on 177 countries from 1968 to 1999, which brings together information from the Rose data set, the ITERATE data set for terrorist events, and data sets of external and internal conflict. We explore these data with traditional and theoretical gravity models. We calculate that, for a given country year, the presence of terrorism together with internal and external conflict is equivalent to as much as a 30% tariff on trade. This is larger than estimated tariff-equivalent costs of border and language barriers and tariff-equivalent reduction through generalized systems of preference and WTO participation.

I. Introduction

WHAT are the major impediments to trade, and what can be done to remove them? In a recent and controversial paper, Andrew Rose (2004) asserts that "while theory, casual empiricism, and strong statements abound, there is, to my knowledge, no compelling empirical evidence showing that the GATT/WTO has actually encouraged trade." Several researchers have reexamined this finding, but the general thrust of Rose's view is well taken—what are the trade-creating and trade-destroying factors that affect world trade?[1]

This question is our paper's focal point, but with a twist. The purpose of our paper is to calculate the economic cost of the effects of *violence* on trade and compare it with the economic cost of other trade barriers to see which is larger in magnitude. We assert that world peace is an important consideration for trade and one that may actually have a larger influence than even bilateral trade pacts. Using data from 177 countries over more than 30 years, we find that peace has a strong statistical and economic effect on trade. We estimate the effect of peace to be greater than that of either multilateral or bilateral trade agreements emanating from WTO membership or from generalized systems of preference (GSPs). Moreover, the negative effect of conflict is greater than language and border effects. These results are robust across regions, time, and country income groups.

Estimating the trade costs of conflict has received less attention in the economic literature than the economic benefits of tariff reduction and nontariff-barrier reduction, on which there is a vast literature.[2] There is, however, a growing body of literature that explores how conflict affects economies through two channels—a domestic channel and a globalization (that is, trade) channel.

Although the purpose of this paper is to concentrate on analyzing the globalization channel, it is instructive to consider first the domestic channel.[3] The domestic channel is a basic story of economic allocation. That is, if the government spends more on the military to quell or to create conflict, consumption and/or investment may be crowded out. One consequence of the decrease in investment would be a decline in future economic growth.[4]

Recently, Blomberg, Hess, and Orphanides (2005), investigated the effect of various forms of conflict such as terrorism, internal wars, and external wars on a country's economic growth. They find that, on average, the incidence of terrorism may have an economically significant negative effect on growth, albeit one that is considerably smaller and less persistent than that associated with either external or internal wars. Terrorism is associated with a redirection of economic activity away from investment spending and toward government spending. They also find that the effects are largest in Africa and amongst nondemocratic states.

A second channel by which economic prosperity is affected by conflict is the globalization channel. The traditional view of the globalization channel is that violence harms the real economy in the same manner as any trade cost. In this case, external conflict, internal conflict, or international terrorist attack leads to a fall in trade, thereby leading to a decline in aggregate activity and a fall in output. Put differently, an increase in terrorism in country A increases the cost of doing business with country A, so that country B will purchase goods or services either domestically or from another, more peaceful country. Thus, violence acts as a distorting tax or tariff that limits the attainment of the benefits from free trade.

Anderson and Marcouiller (2002) have pursued this angle, employing corruption and imperfect contract enforcement as impediments to international trade. They find that omitting indexes of institutional quality obscures the negative relationship between per capita income and the share of total expenditure devoted to traded goods. Their paper, however, does not consider direct measures of conflict.[5] In a complementary study to ours, Glick and Taylor (2005) do consider the direct effect of very large external wars on

Received for publication October 13, 2004. Revision accepted for publication October 14, 2005.

* Claremont McKenna College, and Claremont McKenna College and CESifo, respectively.

We thank Dani Rodrik and two anonymous referees for their excellent suggestions. All errors are our own responsibility.

[1] For example, Subramanian and Wei (2005) have shown that the death of the WTO as a trade promotion device may be overstated, in that the WTO can improve trade strongly but unevenly.

[2] For examples of the benefits to lowering trade barriers see, among others, Anderson (1979), who championed use of the gravity equation with different structural models, including Ricardian models, Heckscher-Ohlin (HO) models, and increasing returns to scale (IRS) models. See also Eaton and Kortum (2002).

[3] There is also the issue of how economic activity affects a nation's proclivity toward violence—see Hess and Orphanides (1995, 2001a,b) and Blomberg, Hess, and Thacker (forthcoming).

[4] Of course, other factors could reduce growth. The rise in uncertainty from a conflict could make households and firms reduce spending, or the nation's productive capacity could be directly affected—for example, see Blomberg (1996).

[5] Nitsch and Schumacher (2004) also analyze some aspects of conflict's impact on trade, but over a significantly shorter time horizon.

The Review of Economics and Statistics, November 2006, 88(4): 599–612

trade from a broader historical perspective. However, they do not consider the effect of terrorism and internal wars on international trade, and the cost to their analysis of a longer time period is that it reduces the number of countries for which data are available.

Our paper investigates the globalization channel by directly analyzing the effect of *all* types of conflict on trade. We employ the workhorse trade model—the gravity model—to determine the economic benefit of peace. We estimate both a traditional and a theoretical gravity model to determine the cost of conflict. We divide conflict into several subcategories to isolate the individual effects of terrorism (*T*), external war (*E*), revolutions (*R*), and interethnic fighting (*IF*) on trade. Furthermore, we also analyze the aggregate effect of conflict on trade by using factor analysis to create a synthetic measure of violence (*TERIF*). In summary, we find that, in total, violent conflict is a larger impediment to trade than traditional tariff barriers. This result should refocus policymakers' attention on encouraging peace as a trade-promoting device to improve economic welfare.

II. The Data and Basic Empirical Regularities

We combine data from five different sources for our project. First, the trade data are obtained from Rose (2004). This is a bilateral data set on trade flows from 1948 to 1999 that has approximately two hundred thousand dyadic observations.

The data we use for organized violence come from three different sources and are given in country-year form, which we convert to dyadic form.[6] We consider four main forms of organized violence.

The first is terrorism (*T*), which is adopted from the ITERATE data set—see Mickolus et al. (1993). For an international or transnational terrorist event, the definition in ITERATE is as follows:

> the use, or threat of use, of anxiety-inducing, extranormal violence for political purposes by any individual or group, whether acting for or in opposition to established governmental authority, when such action is intended to influence the attitudes and behavior of a target group wider than the immediate victims and when, through the nationality or foreign ties of its perpetrators, its location, the nature of its institutional or human victims, or the mechanics of its resolution, its ramifications transcend national boundaries. (p. 2)

The ITERATE project began as an attempt to quantify characteristics, activities, and influences of transnational terrorist groups. The data set is grouped into four categories. First, there are *incident* characteristics, which code the timing of each event. Second, the *terrorist* characteristics yield information about the number, makeup, and groups involved in the incidents. Third, *victim* characteristics describe analogous information on the victims involved in the attacks. Finally, data on *life and property losses* attempt to quantify the damage of the attack. Following Blomberg, Hess, and Orphanides (2005), because we cannot control for the significance of individual events, we define a dummy variable *T* that takes the value 1 if a terrorist event is recorded for either country in a given dyad country-year pair. This measure also has the advantage of defining the incidence of terrorism in a manner comparable to the incidence of other forms of conflict in the data set.[7]

The second type of conflict we consider is external conflict (*E*), which is the initiation or escalation of a foreign policy crisis that results in violence. A foreign policy crisis is defined by Brecher, Wilkenfeld, and Moser (1988) as

> a specific act, event or situational change which leads decision-makers to perceive a threat to basic values, time pressure for response and heightened probability of involvement in military hostilities. A trigger may be initiated by: an adversary state; a non-state actor; or a group of states (military alliance). It may be an environmental change; or it may be internally generated. (p. 3)

Based on these criteria, we code *E* to equal 1 if an external conflict is recorded for either country involved in the same dispute in a given dyad country-year pair.[8] Such a definition is also used in Hess and Orphanides (1995, 2001a,b), Blomberg, Hess, and Weerapana (2004), and Blomberg et al. (2005).

Data for revolutions (*R*) and interethnic fighting (*IF*) are obtained from Gurr, Jaggers, and Moore (2003). Revolutionary conflict is defined as conflict between the government and politically organized groups seeking to overthrow those in power. Such groups include political parties, labor organizations, and parts of the regime itself. Note that for these internal conflicts to be considered, more than 1000 individuals had to be mobilized and 100 fatalities must have occurred. An example of such a conflict would be the Chinese Tiananmen Square massacre of 1989. Again, *R* takes the value 1 if a revolutionary event is recorded for either country in a given dyad country-year pair.

Interethnic fighting and genocide (*IF*), is defined to include the execution, and/or consent of sustained policies by

[6] A data appendix that is more detailed is available upon request from the authors.

[7] In Blomberg et al., (2005) we demonstrate that the effects of terrorism on growth are similar if we use the number of incidents per capita in a given year as a measure of the incidence of terrorism.

[8] E is purposely defined to deal with international issues that the other conflict data cannot examine due to the manner in which they were originally constructed (namely, *T*, *R*, and *IF* were not originally defined in a bilateral manner). *E* is defined as 1 if there exists a conflict between trading partners. This is clearly a lower bound, as some countries do not trade with one another, for example, Israel and Arab countries. Hence, Israel's *E* is about average, whereas Pakistan and India have about two times the average rate. Uganda's *E* is very large due to its limited number of trading partners.

governing elites or their agents that result in the deaths of a substantial portion of a communal group (genocide) or a politicized noncommunal group (politicide). The victims counted are noncombatants, and the percentage of those killed in each group is given more weight than the number of dead. *IF* takes the value 1 if an interethnic fighting or genocide event is recorded for either county in a given dyad country-year pair.

Finally, in an attempt to capture the broad features of all the types of conflict in our data, we construct a synthetic measure of violence from the principal components of the underlying factors of violence. Such a method has been used in other contexts in cross-country analysis, such as that of Kaufmann, Kraay, and Zoido-Lobatn (2000). Specifically, we create a measure of *TERIF* that is obtained from the largest principal component from a principal-components model that is a linear combination of *T*, *E*, *R*, and *IF*. In short, the first principal component explains the largest fraction of the variation in the underlying data, and hence we focus on that as our synthetic measure of the dyad's overall measure of latent conflict. Formally, let $TERIF_{ijt}$ represent dyad *ij*'s unobserved level of terror from factors *T*, *E*, *R*, and *IF*, so that

$$TERIF_{ijt} = \alpha_1 \cdot T_{ijt} + \alpha_2 \cdot E_{ijt} + \alpha_3 \cdot R_{ijt} + \alpha_4 \cdot IF_{ijt} + \epsilon_{ijt}. \quad (1)$$

Using this principal-components model, we estimate *TERIF* by employing information from our four different measures of conflict, *T*, *E*, *R*, and *IF*. The model optimally selects one factor with the relevant output. From this analysis, the factor *TERIF* is given as

$$TERIF_{ijt} = 0.41873 \cdot N(T_{ijt}) + 0.04526 \cdot N(E_{ijt}) + 0.58256 \cdot N(R_{ijt}) + 0.50414 \cdot N(IF_{ijt}), \quad (2)$$

where $N(\cdot)$ standardizes the variable to be standard normal. Given the relative frequencies of each underlying factor, it is not surprising that more weight is associated with *T*, *R*, and *IF* than with *E*.

In summary, we have constructed various measures of violence to include terrorism (*T*), external conflict (*E*), revolutions (*R*), interethnic fighting (*IF*), and an amalgamated measure (*TERIF*).

The basic cross-national and time properties of conflict have been well documented in Blomberg et al. (2005).[9] Four main facts are shown in the violence data. First, terrorism occurs more frequently than other forms of violence, with the greatest incidence occurring in the Americas and Europe.[10] But before concluding that there is a causal relationship between rich democracies and terrorism, it is worth noting that two of the highest-incidence countries, France and Germany, are geographically, politically, and economically close to Nordic countries such as Sweden, Norway, and Finland with virtually no terrorism. Hence, the relationship is not straightforward.

Second, other forms of internal conflict (*R* and *IF*) have been most persistent in nondemocratic regimes and in low-income countries. A possible interpretation is that many nondemocratic and/or low-income countries are inundated with internal strife and that that conflict may explain, in large part, why certain countries fail to advance.

Third, external wars are much less frequent, largely due to the high cost of waging such a war. This is possibly why others, such as Blomberg et al. (2005), find that they have the largest negative impact on growth. Ceteris paribus, a shock from external war is less frequent but extremely harmful to an economy.[11]

Fourth, and perhaps most interestingly for this paper, violence was falling for the last part of the time sample. This is best shown in figure 1. This figure depicts the sum of averages for each country of *T*, *E*, *R*, and *IF* from 1968 to 1999.[12] Notice the increase in the trend of violence until the early 1990s, when there is a large downward swing.[13] This is noteworthy because trade tended to rise precisely at the same time. There are a variety of possible explanations for this, but one would be the general democratization and realignment in a post–Cold War world. As countries moved to more peaceful postures both internally and externally, trade improved as the cost of doing business fell. It is important to note that this swing occurred at a distinct point in time, whereas other international movements to encourage trade, such as the ascendency of WTO, have been more gradual. Hence, this suggests that peace, rather than statutory promotion, plays an important role in encouraging trade.

To investigate these points further, in figure 2A and B we provide several unconditional and conditional cross-country scatterplots to understand better the gross features of trade, trade promotion, and conflict. Figure 2A demonstrates these relationships in a cross section by averaging trade (the vertical axis) and trade promotion (the horizontal axis) from 1968 to 1999. *ONEIN* denotes that one country is a member of the WTO, and *BOTHIN* denotes that both are, and *GSP* denotes whether the countries have a GSP arrangement. Each point on the figure reflects the time average of the

[9] A detailed data appendix is available from the authors upon request.

[10] This is partly because terrorism is measured rather crudely in ITERATE and partly because a terrorist event has relatively low cost for most insurgents.

[11] Because it is infrequent, however, external conflict's effect on economic activity is not always precisely estimated.

[12] The general behavior of the sum is practically identical to that of the factor *TERIF* once *TERIF* is aggregated across countries.

[13] Enders and Sandler (2005) show that there has been no statistical increase in terrorism since September 11, 2001. If anything, they show that there was a decline in hostage taking in the 1990s.

FIGURE 1.—TIME SERIES AVERAGES OF TERROR AND TRADE OVER 177 COUNTRIES

dyadic variables. The unconditional correlation is a simple scatterplot, whereas the conditional correlation is a partial correlation mapped directly from a traditional gravity model [as described in the next section—see equation (3)]. Figure 2A validates the results in Rose (2004) by showing that WTO membership does not help trade, and if anything hinders it. On the other hand, GSPs do tend to encourage trade in both the conditional and the unconditional plots.

Figure 2B provides cross-country plots of trade (the vertical axis) and measures of conflict (the horizontal axis). Here we simply measure violence by a rank ordering of countries by violence (for example, *T*, *R*, and *TERIF*) as the regressor.[14] In this case, paradoxically, violence tends to be positively related to trade in the unconditional model. However, such analysis is impressionistic in that many factors, such as colonization and income, are not included in the unconditional distribution. Once these factors have been allowed for, we see something quite different. Importantly, the conditional plots demonstrate negative effects of violence on trade in each case. Moreover the effect is statistically significant for *R* and *TERIF*, even though these effects may be diminished by time averaging.

To summarize, there appears to be a negative relationship between violence and trade, both in the time domain (Figure 1) and across countries (Figure 2A and B). In the following section, we attempt to sort out these effects of violence on trade.

[14] Similar plots can be made with *E* and *IF,* but are omitted here to reduce clutter.

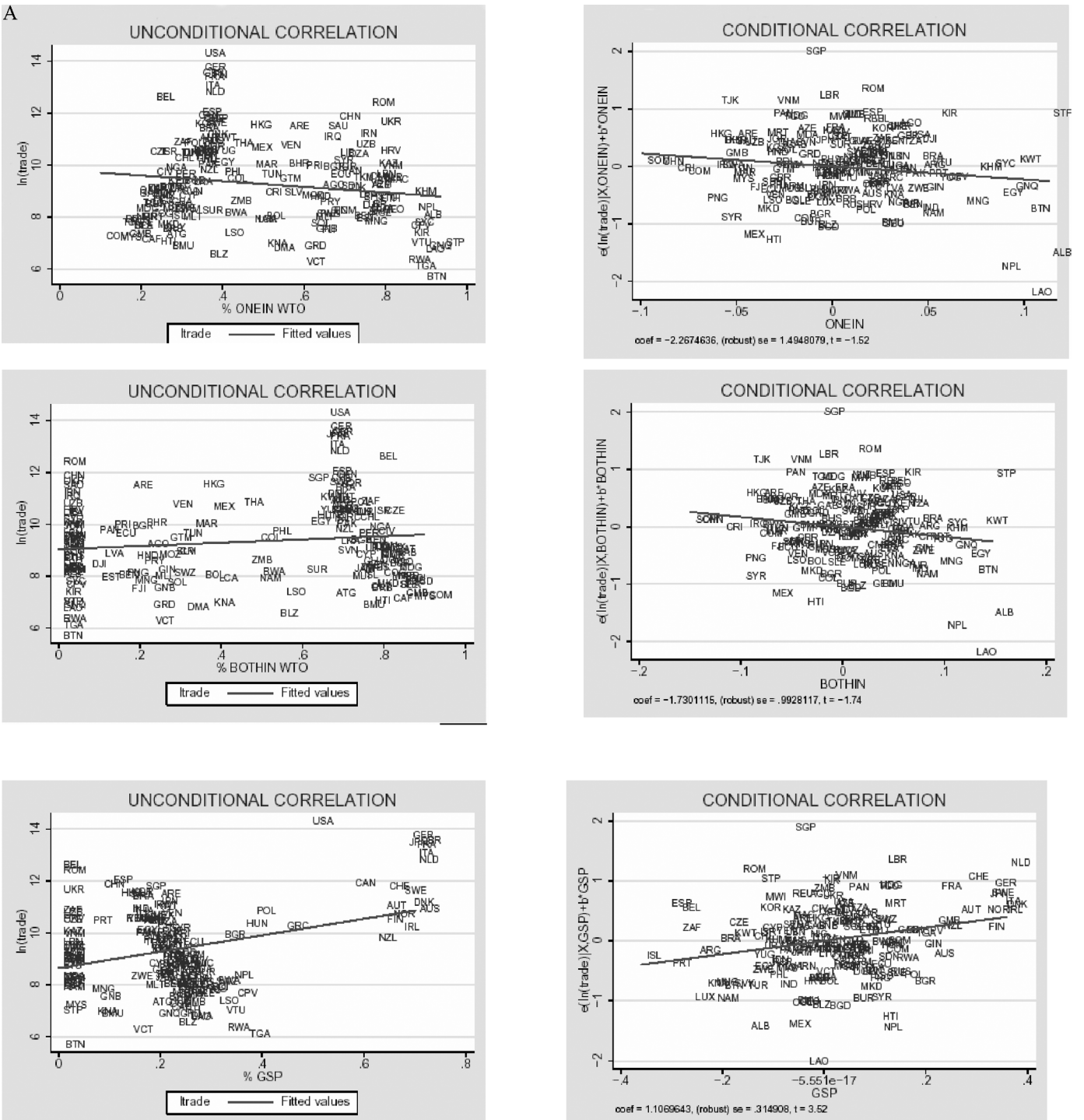
III. Empirical Specification and Results

This section of the paper analyzes the empirical effect of violence on bilateral international trade. We first examine the effect for the traditional gravity model, and then for the theoretical gravity model. We then turn to evaluating the tarifflike effect of violence on trade, and then to demonstrating the robustness of our findings.

We begin our investigation with the traditional gravity model of trade, which is a conventional device used to estimate determinants of trade based on geography and history. Such a workhorse model incorporates how common borders and histories are important in determining trade between any two countries. Formally, the empirical specification of our augmented traditional gravity model is

$$\begin{aligned}\ln X_{ijt} = {} & \beta_0 + \beta_1 \cdot LDIST_{ij} + \beta_2 \ln(RGDP_{it} \cdot RGDP_{jt}) \\ & + \beta_3 \ln\left(\frac{RGDP_{it} \cdot RGDP_{jt}}{POP_{it} \cdot POP_{jt}}\right) \\ & + \beta_4 \cdot COMLANG_{ij} + \beta_5 \cdot BORDER_{ij} \\ & + \beta_9 \cdot COMCOLONY_{ij} \\ & + \beta_{10} \cdot CURCOLONY_{ij} \\ & + \beta_{11} \cdot COLONY_{ij} + \beta_{12} \cdot COMCUR_{ijt} \\ & + \beta_{13} \cdot REGIONAL_{ijt} + \boldsymbol{\phi} \cdot \mathbf{Z} \\ & + \gamma_1 \cdot BOTHIN_{ijt}\end{aligned} \tag{3}$$

FIGURE 2.—THE EFFECT OF (A) TRADE PROMOTION AND (B) VIOLENCE ON TRADE

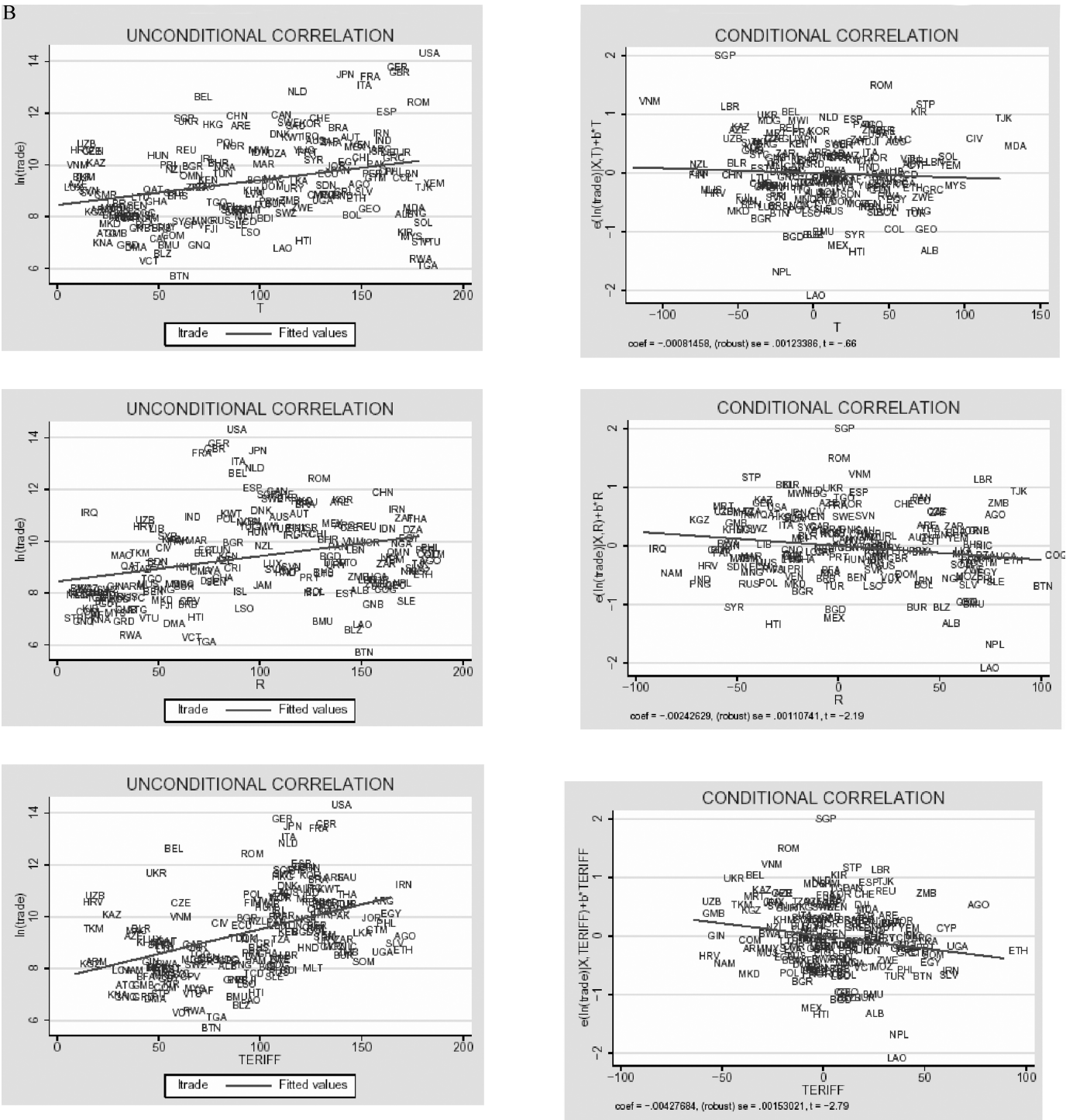


$$+ \gamma_2 \cdot ONEIN_{ijt} + \gamma_3 \cdot GSP_{ijt}$$
$$+ \delta \cdot VIOLENCE_{ijt} + \varepsilon_{ijt},$$

where i, j denote trading partners i and j, and t denotes time. The economic variables are defined as follows: X is the average value of real bilateral trade (exports+imports) divided by GDP, *RGDP* is the real gross domestic product, *POP* is the population, and *LDIST* is the natural log of the distance between two countries.[15] The descriptive and geographic variables are defined as follows: *COMLANG* is a

[15] As in Rose (2004), this is measured as the average value of bilateral trade from country i to j from FOB exports and CIF imports, deflated by the United States CPI.

FIGURE 2.—CONTINUED



dummy variable that is equal to 1 if countries have a common language and 0 otherwise, *COLONY* is a dummy variable that is equal to 1 if countries were ever colonies before 1945, *CURCOLONY* a dummy variable that is equal to 1 if countries were colonized by the given year, *COMCUR* is a dummy variable that is equal to 1 if both countries use the same currency, *BORDER* is a dummy variable for whether the countries share a border, *REGIONAL* is a dummy variable that is equal to 1 if both countries belong to the same regional trade agreement, and **Z** is a vector comprising a comprehensive set of time and dyad fixed effects.[16] The trade variables are defined as follows: *BOTHIN* is a dummy variable that is equal to 1 if both

[16] Of course, when these dyad fixed effects are included, other variables such as *BORDER* cannot be estimated separately.

TABLE 1.—PANEL REGRESSION: TRADE AND VIOLENCE USING TRADITIONAL GRAVITY MODEL

Variable	1 Rose	2 C.E.	3 *T*	4 *E*	5 *R*	6 *IF*	7 All	8 *TERIF*	9 D.E.
BOTHIN	−0.107***	0.265***	0.262***	0.265***	0.251***	0.258***	0.243***	0.244***	0.170***
	[0.023]	[0.058]	[0.058]	[0.058]	[0.058]	[0.058]	[0.058]	[0.058]	[0.054]
ONEIN	−0.084***	0.119**	0.118**	0.119**	0.112**	0.116**	0.110**	0.111**	0.078
	[0.024]	[0.056]	[0.056]	[0.056]	[0.056]	[0.056]	[0.056]	[0.056]	[0.050]
GSP	0.698***	0.509***	0.510***	0.509***	0.509***	0.510***	0.510***	0.511***	0.122***
	[0.095]	[0.032]	[0.032]	[0.032]	[0.032]	[0.032]	[0.032]	[0.032]	[0.026]
LDIST	−1.203***	−1.391***	−1.391***	−1.391***	−1.391***	−1.391***	−1.391***	−1.391***	
	[0.065]	[0.026]	[0.026]	[0.026]	[0.026]	[0.026]	[0.026]	[0.026]	
LRGDP	0.851***	0.304***	0.312***	0.304***	0.308***	0.302***	0.314***	0.316***	0.646***
	[0.022]	[0.046]	[0.046]	[0.046]	[0.046]	[0.046]	[0.046]	[0.046]	[0.042]
LRGDPPC	0.445***	0.207***	0.198***	0.207***	0.195***	0.207***	0.188***	0.187***	−0.093**
	[0.038]	[0.047]	[0.047]	[0.047]	[0.047]	[0.047]	[0.047]	[0.047]	[0.044]
REGIONAL	0.276***	0.278***	0.277***	0.278***	0.277***	0.277***	0.276***	0.276***	0.049***
	[0.051]	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]	[0.019]	[0.015]
CUSTRICT	1.129***	1.181***	1.181***	1.181***	1.184***	1.181***	1.184***	1.183***	0.512***
	[0.042]	[0.147]	[0.148]	[0.147]	[0.147]	[0.147]	[0.147]	[0.148]	[0.149]
COMLANG	0.305***	0.288***	0.288***	0.288***	0.288***	0.288***	0.287***	0.287***	
	[0.013]	[0.047]	[0.047]	[0.047]	[0.047]	[0.047]	[0.047]	[0.047]	
BORDER	0.420***	0.385***	0.384***	0.388***	0.385***	0.384***	0.387***	0.385***	
	[0.027]	[0.107]	[0.107]	[0.107]	[0.107]	[0.107]	[0.107]	[0.107]	
COMCOL	0.630***	0.571***	0.570***	0.571***	0.570***	0.571***	0.570***	0.569***	
	[0.021]	[0.070]	[0.070]	[0.070]	[0.070]	[0.070]	[0.070]	[0.070]	
CURCOL	1.720***	0.558	0.561	0.558	0.564	0.556	0.565	0.564	0.103
	[0.118]	[0.394]	[0.395]	[0.395]	[0.390]	[0.394]	[0.390]	[0.391]	[0.327]
COLONY	1.461***	1.234***	1.235***	1.234***	1.234***	1.234***	1.234***	1.234***	
	[0.025]	[0.100]	[0.100]	[0.100]	[0.100]	[0.100]	[0.100]	[0.100]	
T			−0.051***				−0.043***		
			[0.014]				[0.014]		
E				−0.393			−0.367		
				[0.287]			[0.288]		
R					−0.187***		−0.168***		
					[0.031]		[0.032]		
IF						−0.151***	−0.126***		
						[0.039]	[0.039]		
TERIF								−0.071***	−0.081***
								[0.010]	[0.008]
Observations	199,228	199,228	199,228	199,228	199,228	199,228	199,228	199,228	199,228
R-squared	0.63	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.86

Notes: Robust standard errors clustered by country pair are presented in brackets. ***, **, and * represent statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The results in this table are estimated from equation (1) for 177 countries from 1968 to 1999. Models 2 through 8 include country and time fixed effects. Models 1 through 9 are the basic gravity model adding separately the different forms of terror: the terror index (*TERIFF*), terrorism (*T*), external wars (*E*), revolutions (*R*), and interethnic fights or genocides (*IF*). Model 9 includes only dyad fixed effects.

countries are members of WTO, *ONEIN* is a dummy variable that is equal to 1 if one country is a member of WTO, and *GSP* is a dummy variable that is equal to 1 if both countries are a part of a GSP. *VIOLENCE* is a measure of organized violence that can include terrorism (*T*), external war (*E*), revolution and coups (*R*), and interethnic conflict and genocide (*IF*). *TERIF* is the principal component from the factor model described above.[17]

Table 1 presents a comprehensive set of regression results for the traditional gravity model. The results in the first column generally replicate those in Rose (2004). This baseline specification has four noteworthy features. First, all the standard control variables for common language, common currency, colonial status, distance, and so on are of the expected sign and are statistically significant. Second, the income terms are also of the expected sign (positive) and statistically significant. Third, the presence of a regional trade agreement and a GSP raises bilateral trade and does so in an economically and statistically significant way. However, as emphasized by Rose (2004), membership in the WTO is statistically significant but with the incorrect sign: namely, membership by one country or both countries in the WTO lowers trade. As noted by Subramanian and Wei (2005), however, the results in column 2 of table 1 demonstrate that when one includes country fixed effects, the signs of the coefficients on *BOTHIN* and *ONEIN* become positive rather than negative, and are statistically significant. It is also worthwhile to note that the coefficient associated with GDP is cut in half once these effects are included.

Beginning with column 3 of table 1, we explore the direct effect of violence on bilateral trade. Columns 3 through 6 successively include our measures of terrorism, external conflict, revolutions, and interethnic fighting in the empirical specification, and all four measures of conflict are included in the results in column 7. The results in these five columns, which include country and time fixed effects, demonstrate three key findings that will be shown to be

[17] These variables are coded so that the dummy variables are equal to 1 if either country has experienced an episode of violence of the type considered. This issue is examined further in table 4 below.

robust throughout the remainder of our paper. First, conflict has a statistically significant and robust negative effect on bilateral trade flows. Second, different types of conflict have different negative effects on trade. For example, a country that has a terrorist incident is associated with a 5.1-percentage-point decline in bilateral trade. Though this is an important effect, it is less than half as large as the negative effect on trade from revolutions and interethnic conflict, which are associated with declines of 19 and 15 percentage points, respectively. Third, though external conflict is associated with a tremendous decline in trade, the estimate is not statistically significant.[18] As noted in Blomberg et al. (2005), the difficulty in estimating the effect of external conflict on economic activity is that external wars are infrequent, that many countries that have faced the greatest costs of external conflict (such as Afghanistan and Iraq) simply do not have reliable data, and that countries that get into external conflict with one another usually do not trade much with each other.[19] The results in column 7, where all measures of violence are included, demonstrate remarkably similar findings to when each measure is included separately.

The results in columns 8 through 9 of table 1 demonstrates the robustness of these findings on violence when we use our summary measure of violence from factor analysis, *TERIF*. The results in column 8 suggest that a 1-standard-deviation shock to the *TERIF* indicator is associated with a 7.1-percentage-point decline in bilateral trade. The results in column 9 demonstrate that this finding is robust to the inclusion of dyadic fixed effects.[20]

As an alternative to estimating the effects of violence on trade in a traditional gravity equation, one can estimate the theoretical counterpart of the above gravity equation, namely,

$$\begin{aligned}\ln(RGDP_{it} \cdot RGDP_{jt}X_{ijt}) = {} & \beta_0 + \beta_1 \cdot LDIST_{ij} \\ & + \beta_4 \cdot COMLANG_{ij} \\ & + \beta_5 \cdot BORDER_{ij} \\ & + \beta_9 \cdot COMCOLONY_{ij} \\ & + \beta_{10} \cdot CURCOLONY_{ij} \\ & + \beta_{11} \cdot COLONY_{ij} \\ & + \beta_{12} \cdot COMCUR_{ijt} \qquad (4) \\ & + \beta_{13} \cdot REGIONAL_{ijt} \\ & + \boldsymbol{\phi} \cdot \mathbf{Z} \\ & + \gamma_1 \cdot BOTHIN_{ijt} \\ & + \gamma_2 \cdot ONEIN_{ijt} \\ & + \gamma_3 \cdot GSP_{ijt} \\ & + \delta \cdot VIOLENCE_{ijt} + \varepsilon_{ijt},\end{aligned}$$

and include country dummies to control for multilateral resistance terms (see Feenstra, 2002). Notice that the restrictions on the traditional gravity equation (3) that produce the theoretical gravity equation are that $\beta_2 = 1$ and $\beta_3 = 0$.

Table 2 provides the estimation results for the effect of violence in a theoretical gravity model. The results in this table differ somewhat from those for the traditional gravity specification in table 1. For the most part, however, the estimated coefficients, excluding for the moment those for the measures of violence, are largely unaffected by adopting the theoretical specification rather than the traditional specification. Most importantly, the effects of violence as measured by terrorism and revolutions become much larger (and negative), whereas that for inter-ethnic fighting actually becomes smaller. Overall, however, the measures of violence significantly reduce international trade, with the continuing exception of external conflict.

Although it is important to understand the negative trade consequences of conflict, it is also important to obtain some perspective on how conflict compares to other impediments to trade. If we were to consider violence to be a tariff (that is, a tax) on trade, how big a tariff would it be?[21] Fortunately, there is a methodology to help us study this very question. Following earlier studies, Feenstra (2002) demonstrates that any tariff barrier τ can be related to deep parameters in the utility function as $\exp\{\tau\} = \exp\{\hat{\beta}/(1 - \sigma)\}$, where σ is the elasticity of substitution between domestic and foreign goods and $\hat{\beta}$ is the estimated effect of a particular variable on international trade. Maximizing a CES utility function subject to resource constraints yields the following estimating relationship between trade and tariff costs τ:

$$\begin{aligned}\ln\left(\frac{X_{ijt}}{RGDP_{ijt}}\right) = {} & \beta_0 + \rho(1 - \sigma) \cdot LDIST_{ij} \\ & + (1 - \sigma)\ln \tau_{ijt} + (1 - \sigma)\ln p_i \qquad (5) \\ & + (1 - \sigma)\ln p_j + (1 - \sigma)\varepsilon_{ijt},\end{aligned}$$

[18] Our limited data availability could be one reason that we find little statistical significance for external war's effect on trade. During the period 1968–1999, there are relatively few external wars. Others, most notably Glick and Taylor (2005) and Martin, Mayer, and Thoenig (2005), with longer time horizons, do find a significant effect of war on trade.

[19] Another factor may be related to the coding of the external conflict dummy. The data given makes no distinction as to whether the pair members are adversaries, are possible allies, or are involved in separate wars with third countries. This issue is partially addressed in table 4 by decomposing the effect into variables—*ONEE* and *BOTHE*—which should control to some extent for alliances.

[20] The dyadic fixed effects are not included in the calculation of *R*-squared.

[21] This tax measures the pure distortion and does not incorporate the further unfortunate consequence that it would be a tax that generated zero direct revenue.

TABLE 2.—PANEL REGRESSION: TRADE AND VIOLENCE—THEORETICAL MODEL

	1 Rose	2 C.E.	3 *T*	4 *E*	5 *R*	6 *IF*	7 All	8 *TERIF*	9 D.E.
BOTHIN	−0.187***	0.099*	0.097***	0.099*	0.088	0.092	0.082***	0.082	0.062
	[0.024]	[0.056]	[0.030]	[0.056]	[0.056]	[0.056]	[0.030]	[0.056]	[0.053]
ONEIN	−0.116***	0.024	0.024	0.024	0.019	0.021	0.018	0.018	0.013
	[0.024]	[0.055]	[0.022]	[0.055]	[0.055]	[0.055]	[0.022]	[0.055]	[0.050]
GSP	0.994***	0.489***	0.490***	0.489***	0.488***	0.489***	0.490***	0.490***	0.067***
	[0.010]	[0.032]	[0.016]	[0.032]	[0.032]	[0.032]	[0.016]	[0.032]	[0.026]
LDIST	−1.261***	−1.392***	−1.392***	−1.392***	−1.392***	−1.392***	−1.392***	−1.392***	
	[0.007]	[0.026]	[0.008]	[0.026]	[0.026]	[0.026]	[0.008]	[0.026]	
REGIONAL	0.363***	0.279***	0.279***	0.280***	0.279***	0.279***	0.278***	0.278***	0.042***
	[0.045]	[0.020]	[0.007]	[0.020]	[0.020]	[0.020]	[0.007]	[0.020]	[0.015]
CUSTRICT	0.845***	1.180***	1.179***	1.180***	1.182***	1.179***	1.181***	1.181***	0.494***
	[0.045]	[0.148]	[0.046]	[0.148]	[0.148]	[0.148]	[0.046]	[0.148]	[0.140]
COMLANG	0.428***	0.288***	0.288***	0.289***	0.288***	0.288***	0.288***	0.288***	
	[0.014]	[0.047]	[0.014]	[0.047]	[0.047]	[0.047]	[0.014]	[0.047]	
BORDER	−0.048*	0.380***	0.379***	0.383***	0.379***	0.379***	0.381***	0.380***	
	[0.027]	[0.108]	[0.029]	[0.108]	[0.108]	[0.108]	[0.029]	[0.108]	
COMCOL	0.705***	0.570***	0.569***	0.570***	0.569***	0.570***	0.569***	0.569***	
	[0.021]	[0.070]	[0.020]	[0.070]	[0.070]	[0.070]	[0.020]	[0.070]	
CURCOL	2.285***	0.587	0.591***	0.588	0.593	0.585	0.594***	0.594	0.137
	[0.119]	[0.390]	[0.140]	[0.390]	[0.387]	[0.390]	[0.140]	[0.387]	[0.335]
COLONY	1.371***	1.239***	1.240***	1.239***	1.239***	1.239***	1.239***	1.239***	
	[0.027]	[0.101]	[0.037]	[0.101]	[0.101]	[0.101]	[0.037]	[0.101]	
T			−0.058***				−0.052***		
			[0.011]				[0.011]		
E				−0.375			−0.354*		
				[0.291]			[0.205]		
R					−0.140***		−0.120***		
					[0.031]		[0.018]		
IF						−0.134***	−0.115***		
						[0.039]	[0.022]		
TERIF								−0.061***	−0.069***
								[0.010]	[0.008]
Observations	199,228	199,228	199,228	199,228	199,228	199,228	199,228	199,228	199,228
R-squared	0.25	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.74

Notes: Robust standard errors clustered by country pair are presented in brackets. ***, **, and * represent statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The results in this table are estimated from equation (2) for 177 countries from 1968 to 1999. Column 1 is the basic theoretical gravity model. Columns 2–7 are the theoretical gravity model including country and time fixed effects. Columns 8–9 include the factor *TERIFF,* first with country and time fixed effects, then with dyad and time fixed effects alone.

where σ is the CES parameter, ρ is the effect of distance on transportation cost, and p are prices. This specification has the added benefit of allowing us to calculate the tariff cost associated with *T*, *E*, *R*, and *IF* versus other widely accepted costs such as border effects, language, and colony effects.

Unfortunately, tariff costs are unobservable. Instead we observe multilateral resistance terms, such as borders and conflicts, that are given as a vector of dummy variables, $\mathbf{D}_{ij} = (COMLANG_{ij}, BORDER_{ij}, COMCOL_{ij}, CURCOL_{ij}, COLONY_{ij}, CUSTRICT_{ij}, REGIONAL_{ij}, BOTHIN_{ij}, ONEIN_{ij}, GSP_{ij})$, so that our empirical representation is actually

$$\ln\left(\frac{X_{ijt}}{RGDP_{ijt}}\right) = \beta_1 \cdot LDIST_{ij} + \beta D_{ijt} + \varepsilon_{ijt} \qquad (6)$$

with country dummies and intercepts suppressed in the exposition (but included in the regression) to control for price terms. Combining these two expressions, we get $\beta D = (1 - \sigma) \ln \tau$, so that for any given resistance term, we can calculate the tariff equivalent by substituting elasticity values, that is, $\tau = \beta/(1-\sigma)$.

Unfortunately, in order to implement this calculation, the elasticity of substitution, σ, must be separately provided. It is straightforward to see that σ scales the estimated effects up and down so that an increase in σ lowers the estimated trade effect from any impediment to trade. Based on empirical research, however, such as in Anderson and Van Wincoop (2003), it is typical for researchers to calculate these tariff-equivalent factors using values of σ equal to 5 and 10.

In table 3, we provide these estimated effects on trade of the usual suspects and our measures of violence. The first five columns report the estimates with a lower bound of 5 for the CES elasticity, 5 and the last five columns report the estimates with an upper bound of 10.

We begin by analyzing the effects of the usual suspects and trade. Table 3 reports that regional trade agreements and currency unions have the most positive effects on trade, approximately at 12% to 28%, respectively, depending on the elasticity. These effects are similar to what has been found by Rose and Van Wincoop (2001) and have a larger magnitude than any in the standard tariff-equivalent trade cost literature. Common-language tariff-equivalent trade costs have a magnitude of approximately 4% to 9%, which is a few percent below what is found in the literature (see Eaton & Korum, 2002). However, this is largely explained by our inclusion of the previously ignored colony dummies (*COMCOL*, *CURCOL*, and *COLONY*), each costing a tariff

TABLE 3.—TARIFF EQUIVALENT TRADE COSTS

	σ = 5					σ = 10				
	T	*E*	*R*	*IF*	All	*T*	*E*	*R*	*IF*	All
BOTHIN	−21.35	−21.14	−21.26	−21.38	−21.56	−8.98	−8.90	−8.94	−8.99	−9.07
ONEIN	−10.52	−10.52	−10.54	−10.63	−10.60	−4.54	−4.54	−4.56	−4.59	−4.58
GSP	6.64	6.50	6.69	6.50	6.81	3.01	2.94	3.03	2.94	3.08
REGIONAL	24.36	24.65	24.52	24.61	24.29	11.67	11.82	11.75	11.80	11.63
CUSTRICT	27.66	27.67	27.71	27.67	27.69	13.40	13.41	13.43	13.41	13.42
COMLANG	7.13	7.16	7.13	7.16	7.11	3.24	3.25	3.24	3.25	3.22
BORDER	8.81	8.90	8.84	8.84	8.86	4.02	4.06	4.03	4.03	4.04
COMCOL	13.02	13.04	13.02	13.04	13.00	6.01	6.02	6.01	6.02	6.00
CURCOL	22.57	22.43	22.43	22.43	22.57	10.74	10.68	10.68	10.68	10.74
COLONY	27.33	27.31	27.29	27.33	27.31	13.23	13.22	13.21	13.23	13.22
T	−1.46				−1.31	−0.65				−0.58
E		−9.83			−9.25		−4.25			−4.01
R			−3.56		−3.05			−1.57		−1.34
IF				−3.41	−2.92				−1.50	−1.29
TERROR	−1.46	−9.83	−3.56	−3.41	−16.52	−0.65	−4.25	−1.57	−1.50	−7.22

Notes: See table 2. The results in this table are estimated from equation (2) for 177 countries from 1968 to 1999. The first five columns are the basic theoretical gravity model effects by individually and then jointly including measures of conflict assuming a CES elasticity of 5. The final five columns are the basic theoretical gravity model effects by individually and then jointly including measures of conflict assuming a CES elasticity of 10. *VIOLENCE* is the sum of *T*, *E*, *R*, and *IF*. Each number represents a tariff-equivalent percentage.

equivalent of 6% to 27% percent of trade.[22] Finally, adding all of these trade costs together, we find that the tariff equivalent of trade costs is between 50% and 100%, which is consistent with what has been found by Eaton and Korum (2002). However, the other usual cost, national border barriers, is found to have the tariff-equivalent price of 4% to 9%.[23]

In general, our estimates of the gravity equation are reasonably consistent across the different measures of trade costs. This is important when considering the tariff equivalent trade cost of violence in table 3. We estimate that some forms of violence such as terrorism, revolutions, or interethnic fighting have a smaller cost (1% to 3%), whereas other forms such as external war have a larger cost (4% to 10%). Taking them together, we estimate the tariff-equivalent cost of violence to be between 7% and 17%. This is higher than the costs from language and border barriers and significantly higher than the benefits from GSPs and WTO/GATT membership.

In table 4 we reexplore our earlier findings for the effect of violence on trade. In particular, we parse out the measures of terrorism, external conflict, revolutions, and interethnic fighting, so that we take account of whether just one of the two countries is experiencing this type of conflict, or both are simultaneously engaged. For example, *ONET* is a dummy variable equal to 1 only if at least one of the two countries experienced an episode of terrorism in a given year, and *BOTHT* is a dummy variable for whether both countries did. Similarly, *ONEE*, *BOTHE*, *ONER*, *BOTHR*, *ONEIF*, and *BOTHIF* are defined for external conflict, revolutions, and interethnic fighting. In each of the first five columns of table 4 we report regression results using the traditional gravity equation in equation (3); in columns 6 through 10 we report the results when the theoretical gravity equation in equation (4) is estimated.

Column 1 presents the estimation results for terrorism's effect on trade. Terrorism, whether felt by one country or both countries, appears to lower international trade by approximately the same amount, 4 percentage points. Second, if just one country is engaged in an external war, this appears to lower bilateral trade by a similar amount. The result, however, for whether both countries are in an external conflict is not statistically different from 0, probably for the same reasons for which external conflict was not significant in tables 1 and 2—namely, this occurs very infrequently.[24] Thirdly, revolutions limit trade, but especially so if both countries face revolutions, as that is associated with a 40-percentage-point reduction. Finally, if one country is engaged in interethnic fighting, this is associated with a 12-percentage-point decline in trade, though the effect on trade if both face such a type of conflict is not statistically significant, probably for the reason that such a scenario is very rare.

The results from the theoretical gravity specification in columns 6 through 10 of table 4 are very similar to those in the first five columns, with the exception that the effect of violence on trade may be larger. For example, in column 6, where we estimate the theoretical gravity specification, the effect of terrorism is larger, and significantly larger still if

[22] We also estimated the regression without colony costs (not reported here) and found similar magnitudes of the tariff-equivalent cost of language to those of Eaton and Korum (2002). Our general results do not depend on the inclusion or exclusion of colony costs. We include them because they demonstrate a cost not previously reported in the literature and to prevent omitted variable bias.

[23] Note that these estimates are approximately half of what others have reported—see Feenstra (2002). Two explanations are possible: First, the data sample in the literature has typically examined inter- and intranational trade, which our paper does not. The loss in variation in our sample could easily bias the estimates downward. Second, the country choice in our sample is much larger. The first paper in the literature only examined trade in Canada and the United States. The inclusion of many countries without a border in our sample could also explain the smaller number.

[24] *ONEE* occurs in approximately 1.5% of the observations, whereas *BOTHE* occurs in 0.04%.

TABLE 4.—TRADE AND VIOLENCE: TREATING VIOLENCE DIFFERENTLY

	Traditional Gravity Model					Theoretical Gravity Model				
Variable	1 *T*	2 *E*	3 *R*	4 *IF*	5 All	6 *T*	7 *E*	8 *R*	9 *IF*	10 All
ONET	−0.052***				−0.049***	−0.059***				−0.057***
	[0.015]				[0.015]	[0.011]				[0.015]
BOTHT	−0.039**				−0.031*	−0.052***				−0.046***
	[0.016]				[0.016]	[0.016]				[0.016]
ONEE		−0.019*			−0.014		−0.007			−0.004
		[0.012]			[0.013]		[0.013]			[0.013]
BOTHE		−0.38			−0.373		−0.37			−0.365
		[0.288]			[0.288]		[0.292]			[0.292]
ONER			−0.149***		−0.134***			−0.104***		−0.088***
			[0.029]		[0.029]			[0.029]		[0.029]
BOTHR			−0.441***		−0.421***			−0.365**		−0.342**
			[0.156]		[0.155]			[0.159]		[0.158]
ONEIF				−0.118***	−0.091**				−0.108***	−0.090**
				[0.036]	[0.036]				[0.036]	[0.036]
BOTHIF				−0.088	−0.039				−0.087	−0.056
				[0.173]	[0.173]				[0.174]	[0.175]
Total effect						−2.81	−9.88	−12.44	−5.00	−29.95
Obs.	199,228	199,228	199,228	199,228	199,228	199,228	199,228	199,228	199,228	199,228
R-squared	0.72	0.72	0.72	0.72	0.72	0.47	0.47	0.47	0.45	0.47

Notes: Robust standard errors are presented in brackets. ***, **, and * represent statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The results in this table are estimated from either equation (1) or (2) for 177 countries from 1968 to 1999. Columns 1–5 are for the basic gravity model. Columns 6–10 are for the theoretical gravity model including country fixed effects. The coefficient associated with *ONEx* measures the effect if one of the dyad pair has conflict type *x*. The coefficient associated with *BOTHx* measures the effect if both of the dyad pair have conflict type *x*. None of the control variables are reported. Total effect is the estimated effect on trade from all terror variables with $\sigma = 5$.

both countries face terrorism. Indeed, on average the effect is approximately 20% larger. One exception, however, is that the effect of external war on trade is no longer statistically significant. Of course, the additional bonus for estimating the theoretical gravity specification is that one can interpret the tariff-equivalent effect of violence on trade. As demonstrated in column 10, violence is equivalent approximately to a 30% tariff, which for $\sigma = 5$ is larger than the effect presented in table 3 (17%).

There are some caveats in making such comparisons, however. First, the violence episodes may be temporary, lasting only a few years, whereas geographic, policy, and other barriers to trade tend to be more persistent. Thus, even if the estimated coefficients in a gravity model are similar, in a present-value sense the costs of violence should be considered lower than those of most other trade barriers.

Second, the upper-end estimate of the aggregate flow tariff-equivalent costs of violence may overstate these costs. The estimates reported in table 4 presume that a country is involved in or exposed to all of these forms of violence at the same time. On the one hand, this makes sense to the extent to which at least one country in the world every year is the locus of each of these forms of violence; this will indeed affect trade with all of the trade partners of these violent countries. But the total effect includes effects from the *BOTH* and *ONE* forms of violence, which are mutually exclusive.

As the results in table 4 demonstrate, our baseline estimates of the traditional gravity specification in equation (3), reported in table 1, are robust across the modifications considered in tables 2 and 4. In table 5, however, we examine further the robustness of our result on the effect of conflict on trade across different regions and time periods. Columns 1 through 7 of table 5 report the results from a traditional gravity specification where we include the factor index *TERIF* in each specification.[25] As can be seen from the appropriate rows of the table, the estimate is statistically significant at below the 0.01 level in all cases, and the coefficient estimates vary from −0.039 in high-income countries to −0.102 in East Asia. Columns 8 and 9 explore the effect of violence on trade when we split the sample in 1983. Interestingly, the estimated effect is much lower, though still statistically significant at the 10% level, for the 1968–1983 subsample. The coefficient is 4 times larger for the second half of the sample. This may be because, even though the number of incidents has fallen in the most recent past, the percentage of those that resulted in casualties has risen slightly (Enders & Sandler, 2005).

Columns 10–12 continue to demonstrate the robustness of our results. Column 10 considers including country fixed effects interacted with time fixed effects as a further control for multilateral resistance terms. Due to computational difficulties, we were only able to consider interacting the country dummies with decade dummies. It is interesting that, if anything, the coefficient associated with violence becomes larger in magnitude. Column 11 addresses the issue of dynamics and lag structure. As it is possible that

[25] The regions we consider are South Asia, East Asia, the Middle East and North Africa, Latin America and the Caribbean, and high- and low-income countries. The last classification is from Rose (2004) and is obtained from the World Bank Development Indicators.

TABLE 5.—SENSITIVITY ANALYSIS: TRADE AND VIOLENCE BY REGION AND TIME

Variable	1 SASIA	2 EASIA	3 SSAFR	4 MIDEAF	5 LATCA	6 HIGHIN	7 LOWIN	8 1968–83	9 1984–99	10 *cty · yr*	11 Lag	12 Imports
BOTHIN	0.696*	0.280**	−0.167	0.097	0.131	0.252**	0.017	−0.349***	0.244***	0.312***	0.230***	−0.053
	[0.416]	[0.126]	[0.127]	[0.110]	[0.088]	[0.121]	[0.106]	[0.088]	[0.088]	[0.073]	[0.060]	[0.105]
ONEIN	0.388	0.187*	−0.285**	−0.004	0.033	0.186	−0.107	−0.161**	0.107	0.150**	0.108*	−0.043
	[0.386]	[0.109]	[0.114]	[0.088]	[0.083]	[0.129]	[0.091]	[0.066]	[0.084]	[0.063]	[0.059]	[0.093]
GSP	0.006	0.278***	0.479***	0.538***	0.298***	0.317***	0.447***	0.385***	0.601***	0.549***	0.531***	0.408***
	[0.151]	[0.097]	[0.057]	[0.085]	[0.058]	[0.031]	[0.052]	[0.031]	[0.048]	[0.032]	[0.034]	[0.043]
LDIST	−1.172***	−1.417***	−1.670***	−1.660***	−1.713***	−1.335***	−1.415***	−1.272***	−1.479***	−1.437***	−1.391***	−1.381***
	[0.277]	[0.163]	[0.082]	[0.129]	[0.077]	[0.038]	[0.054]	[0.030]	[0.029]	[0.025]	[0.026]	[0.034]
LRGDP	0.354***	0.784***	0.095	0.748***	0.734***	0.298***	0.162**	0.305***	0.805***	0.790***	0.301***	
	[0.119]	[0.131]	[0.085]	[0.097]	[0.092]	[0.064]	[0.075]	[0.073]	[0.080]	[0.016]	[0.049]	
$LRGDP_i$												0.955***
												[0.123]
$LRGDP_j$												−0.157
												[0.141]
LRGDPPC	−0.162	−0.233*	0.249***	−0.195*	−0.148	0.393***	0.180**	0.439***	−0.728***	0.033	0.198***	
	[0.119]	[0.140]	[0.088]	[0.106]	[0.094]	[0.070]	[0.076]	[0.097]	[0.080]	[0.023]	[0.050]	
$LRGDPPC_i$												−0.230*
												[0.123]
$LRGDPPC_j$												1.555***
												[0.145]
REGIONAL		0.149***			0.307***	0.208***	0.213***	0.378***	0.235***	0.252***	0.274***	0.271***
		[0.024]			[0.034]	[0.023]	[0.035]	[0.029]	[0.021]	[0.020]	[0.019]	[0.033]
CUSTRICT	1.096	1.399***	1.478***	−0.522	0.012	0.723**	1.578***	1.135***	1.123***	1.096***	1.156***	0.820***
	[0.774]	[0.315]	[0.192]	[0.795]	[0.236]	[0.292]	[0.187]	[0.161]	[0.183]	[0.144]	[0.152]	[0.203]
COMLANG	0.104	0.037	0.298***	0.091	0.589***	0.330***	0.117	0.206***	0.351***	0.252***	0.277***	0.322***
	[0.154]	[0.130]	[0.085]	[0.119]	[0.082]	[0.056]	[0.077]	[0.053]	[0.054]	[0.047]	[0.047]	[0.062]
BORDER	−0.716	−0.591	1.134***	0.068	−0.3	−0.391**	0.877***	0.260**	0.506***	0.296***	0.371***	0.221*
	[0.636]	[0.380]	[0.179]	[0.249]	[0.195]	[0.164]	[0.171]	[0.128]	[0.116]	[0.105]	[0.108]	[0.126]
COMCOL	0.336*	0.483***	0.467***	0.830***	0.511***	0.041	0.551***	0.462***	0.628***	0.615***	0.563***	0.276***
	[0.202]	[0.166]	[0.110]	[0.148]	[0.155]	[0.107]	[0.098]	[0.082]	[0.080]	[0.069]	[0.071]	[0.095]
CURCOL	0	1.639***	−0.49	0.904***	1.133***	0.665	−0.204	0.836**	−0.333	0.629*	0.51	0.459
	[0.000]	[0.296]	[0.861]	[0.314]	[0.225]	[0.433]	[1.213]	[0.380]	[0.535]	[0.370]	[0.412]	[0.453]
COLONY	0.221	1.104***	1.693***	0.597**	0.848***	1.277***	1.458***	1.352***	1.147***	1.256***	1.240***	1.241***
	[0.257]	[0.265]	[0.146]	[0.247]	[0.157]	[0.099]	[0.157]	[0.104]	[0.108]	[0.101]	[0.101]	[0.127]
TERIF	−0.051**	−0.102***	−0.044***	−0.073***	−0.063***	−0.039***	−0.064***	−0.017*	−0.063***	−0.074***	−0.049***	−0.055***
	[0.024]	[0.021]	[0.017]	[0.022]	[0.016]	[0.010]	[0.014]	[0.011]	[0.013]	[0.010]	[0.008]	[0.021]
$TERIF_{ijt-1}$											−0.026***	
											[0.008]	
Observations	16450	32021	75445	33704	61838	106991	92322	86861	112367	199228	187108	27530
R-squared	0.75	0.72	0.59	0.69	0.69	0.82	0.62	0.72	0.73	0.72	0.72	0.72

Notes: Robust standard errors are presented in brackets. ***, **, and * represent statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. The results in this table are estimated from either equation (1) for 177 countries from 1968 to 1999. Each column is for the basic gravity model including time and country fixed effects. Each column represents a different region or time period. SASIA is South Asia, EASIA is East Asia, MIDEAF is the Middle East and North Africa, LATCA is Latin America and the Caribbean, HIGHIN is high-income countries, LOWIN is low-income countries, *cty · yr* includes time and country dummies interacted with each other, Lag represents the regression that includes an additional lag of *TERIF*, and Imports is a regression with the log of imports included as the dependent variable.

violence has a delayed effect on trade, we add a lag of *TERIF* to the regression. The contemporaneous effect is seen to be larger, though both current and lagged effects are negative and statistically significant. Finally, column 12 considers an alternative model and data for trade, following Subramanian and Wei (2005). This specification employs unidirectional trade (that is, country A's imports from country B) as the left-side variable and modifies the regression by including importer and exporter fixed effects along with separate effects for GDP and GDP per capita.[26] The estimated effect of *TERIF* continues to be negative, statistically significant, and in line with the previously reported regressions.

As a final step, we consider the issue of endogeneity. If peace can improve trade, then it is possible that trade can cause peace. Indeed, some of the political science literature discusses the issue of whether trade has a substantial benefit in reducing interstate violence—among other papers in this vast literature, see Mansfield (1994) and Oneal and Russett (1999). To consider this possibility, we estimate the traditional gravity equation and use instruments for violence through the strategic components of trade. In this case, we instrument for conflict using UN voting records as in Bennett and Stam (1999). Table 6 reports the results from this estimation. In this case, we again find a strong negative effect of violence on trade. Note that the magnitudes of the coefficients are somewhat larger, although there is no evidence of misspecification, as the overidentifying restrictions are not rejected in any of the specifications. These instruments appear to be rather strong as well. Though not reported, the results from first-stage regression show that the coefficients associated with UN voting records are statistically significant at the 0.01 level in each case. Hence, our earlier results on the tariff cost withstand the scrutiny of exogeneity.

[26] We did not employ this methodology and data throughout, for there are several problems with the data in Subramanian and Wei (2004). For example, the data are only given in 5-year intervals, and all small trade observations are excluded. Hence, much of the interesting information is dropped when using their data.

IV. Conclusions

Our work follows that of Rose (2004), who shows that many of the usual suspects in determining the magnitude of

TABLE 6.—IV PANEL REGRESSION: TRADE AND VIOLENCE

Variable	1 *TERIF*	2 *T*	3 *E*	4 *R*	5 *IF*
ONEIN	−0.097**	−0.006	0.1	−0.085**	−0.146***
	[0.041]	[0.066]	[0.141]	[0.039]	[0.050]
GSP	0.562***	0.611***	0.565***	0.556***	0.552***
	[0.024]	[0.072]	[0.122]	[0.024]	[0.025]
BOTHIN	−0.271***	−0.183	0.063	−0.186***	−0.396***
	[0.083]	[0.196]	[0.227]	[0.068]	[0.106]
IRGDP	0.106**	0.745	−0.164*	0.236***	−0.248***
	[0.051]	[0.471]	[0.095]	[0.064]	[0.021]
IRGDPPC	0.702***	0.225	0.916***	0.539***	1.030***
	[0.060]	[0.411]	[0.170]	[0.077]	[0.030]
REGIONAL	1.021***	0.55	2.238***	1.088***	1.104***
	[0.062]	[0.343]	[0.860]	[0.060]	[0.061]
CUSTRICT	1.252***	1.232***	1.480***	1.286***	1.221***
	[0.058]	[0.089]	[0.354]	[0.062]	[0.062]
LDIST	−1.437***	−1.450***	−1.694***	−1.428***	−1.439***
	[0.010]	[0.018]	[0.216]	[0.011]	[0.011]
COMLANG	0.292***	0.267***	0.424***	0.291***	0.300***
	[0.018]	[0.035]	[0.127]	[0.019]	[0.019]
BORDER	0.373***	0.284***	4.011	0.374***	0.358***
	[0.035]	[0.065]	[2.941]	[0.037]	[0.037]
COMCOL	0.529***	0.467***	0.736***	0.531***	0.546***
	[0.025]	[0.050]	[0.203]	[0.026]	[0.027]
CURCOL	3.082	4.551	3.169	2.81	2.835
	[2.030]	[3.260]	[10.071]	[2.136]	[2.175]
COLONY	1.226***	1.303***	0.481	1.209***	1.226***
	[0.044]	[0.076]	[0.645]	[0.047]	[0.047]
TERIF	−1.108***				
	[0.175]				
T		−6.542**			
		[3.243]			
E			−453.555		
			[364.793]		
R				−4.822***	
				[0.688]	
IF					−5.365***
					[0.888]
Chi-squared (1)	1.302	1.702	1.640	1.522	1.054
P-value	[0.254]	[0.192]	[0.200]	[0.217]	[0.305]
Observations	149862	149862	149862	149862	149862

Notes: robust standard errors are presented in brackets. ***, **, and * represent statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. Each column is for the basic gravity model including country fixed effects. Instruments include factors based on annual UN voting records. Test of overidentifying restrictions are reported as *chi*-squared (1) with the associated *P*-values.

trade flows (for example, WTO/GATT) are not as important as the adoption of generalized systems of preference (GSPs). From the analysis presented in this paper, it appears that the effect of conflict on trade is quite strong—even larger than that of GSPs.

What are the policy implications of our paper? Although pursuing trade promotion through bilateral vehicles like GSPs has important effects on trade, another avenue is likely to have a larger one peace. We find peace has a large and positive effect on trade. This is obviously only a lower bound on the welfare gain to peace, though it is an important component to raising economic welfare.

Along the same line, Hess (2003) analyzes the consumption welfare loss from internal and external conflict in order to answer the question: "How much would individuals be willing to pay to avoid just the economic costs of conflict?" Remarkably, his estimates suggest that these pure economic welfare losses from conflict are quite large: on average, individuals who live in a country that has experienced some conflict since 1960 would *permanently* give up to approximately 8% of their current level of consumption to live in a purely peaceful world. Taken together, the large potential welfare gains to consumption identified in Hess (2003), in addition to those from bilateral trade identified in this paper, suggests that economists and policymakers should continue to investigate and advocate domestic and international institutions that promote peace in order to realize such gains.

REFERENCES

Anderson, J. "A Theoretical Foundation for the Gravity Equation," *American Economic Review* 69:1 (1979), 106–116.

Anderson, J., and D. Marcouiller, "Insecurity and the Pattern of Trade: An Empirical Investigation," this REVIEW, 84:2 (2002), 342–352.

Anderson, J., and E. Van Wincoop, "Gravity with Gravitas: A Solution to the Border Puzzle," *American Economic Review* 93:1 (2003), 170–192.

Bennett, Scott, and Atlan Stam, "*EUGene: Expected Utility Generation and Data Management Program*" (1997–2003), http://eugenesoftware.org.

Blomberg, S. Brock, "Growth, Political Instability and the Defence Burden," *Economica* 63:252 (1996), 649–672.

Blomberg, S. Brock, Gregory D. Hess, and Athansios Orphanides, "The Macroeconomic Consequences of Terrorism," *Journal of Monetary Economics,* 51 (2005) 1007–1032.
Blomberg, S. Brock, Gregory D. Hess, and Siddharth Thacker, "Is There a Conflict-Poverty Trap?" *Economics and Politics* (forthcoming).
Blomberg, S. Brock, Gregory D. Hess, and Akila Weerapana, "Economic Conditions and Terrorism," *European Journal of Political Economy* 20 (2004) 463–478.
Brecher, Michael, Jonathan Wilkenfeld, and Sheila Moser, "Crises in the Twentieth Century," in *Handbook of International Crises,* Vol. I (Oxford, UK: Pergamon Books, 1988).
Eaton, J., and S. Kortum, "Technology, Geography and Trade," *Econometrica* 70 (2002), 1741–1779.
Enders, Walter, and Todd Sandler, "After 9–11: Is It All Different Now?" *Journal of Conflict Resolution* 49:2 (2005), 259–277.
Feenstra, Robert, *Advanced International Trade: Theory and Evidence* (Princeton University Press, 2002).
Glick, Reuven, and Alan Taylor, "Collateral Damage: Trade Disruption and the Economic Impact of War," NBER working paper no. 11565 (2005).
Gurr, T.R., K. Jaggers, and W. Moore, *Polity Handbook IV* (Boulder: University of Colorado Press, 2003).
Hess, Gregory D., "The Economic Welfare Cost of Conflict: An Empirical Assessment," CESifo *Working Paper* no. 852 (2003).
Hess, Gregory D., and Athanasios Orphanides, "War Politics: An Economic, Rational-Voter Framework," *American Economic Review* 85:4 (1995), 828–846.
——— "Economic Conditions, Elections, and the Magnitude of Foreign Conflicts," *Journal of Public Economics* 80:1 (2001a), 121–140.
——— "War and Democracy," *The Journal of Political Economy* 109:4 (2001b), 776–810.
Kaufmann, D., A. Kraay, P. Zoido-Lobatn, "Governance Matters: From Measurement to Action," *Finance and Development* (2000).
Mansfield, Edward, *Poverty, Trade and War* (Princeton University Press, 1994).
Martin, Philippe, Thierry Mayer, and Mathias Thoenig, "Make Trade Not War," University of Paris (2005).
Mickolus, Edward, Todd Sandler, Jean Murdock, and Peter Flemming, *International Terrorism: Attributes of Terrorist Events 1988–91 (ITERATE 4)* (Dunn Loring: VA, Vinyard Software, 1993).
Nitsch, Volber, and Dieter Schumacher, "Terrorism and Interational Trade: An Empirical Investigation," *European Journal of Political Economy* 20:2 (2004) 423–433.
Oneal, John, and Bruce Russett, "The Kantian Peace: The Pacific Benefits of Democracy, Interdependence, and International Organizations, 1885–1992," *World Politics* 52:1 (1999), 1–37.
Rose, Andrew, "Do We Really Know That the WTO Increases Trade?" *American Economic Review* 94:1 (2004).
Rose, Andrew, and Eric Van Wincoop, "National Money as a Barrier to Trade: The Real Case for Currency Union," *American Economic Review* 91:2 (2001), 386–390.
Subramanian, Arvind, and Shang-Jin Wei, "The WTO Promotes Trade Strongly but Unevenly," CPER Discussion Paper 5122 (2005).