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Trade and Terrorism: A Disaggregated Approach

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Abstract

This paper constructs a model of trade consequences of terrorism, where firms in trading nations face different costs arising from domestic and transnational terrorism. Using dyadic dataset in a gravity model, we test terrorism's effects on overall trade, exports, and imports, while allowing for disaggregation by primary commodities and manufacturing goods. While terrorism has little or no influence on trade of primary products, terrorism reduces trade of manufactured goods. This novel finding pinpoints the avenue by which terrorism harms trade and suggests why previous studies that looked at all trade found modest impacts. Moreover, the detrimental effect of transnational terrorism on total manufactured trade, exports, and imports as well as on various classes of manufactured trade is substantially larger than that of domestic terrorism. Generally, this adverse impact is more pronounced for imports than for exports.

Keywords: International trade, domestic and transnational terrorism, imports and exports, gravity model
JEL classification: F14, D74, H56

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Trade and Terrorism: A Disaggregated Approach

1. Introduction

In recent years, terrorists are intent on causing harm to the economies of targeted countries as a means of generating constituency pressure on governments to concede some terrorist demands (Enders and Sandler 2012). Terrorist-induced macroeconomic consequences on gross domestic product (GDP) and economic growth have been identified in the literature (Blomberg et al. 2004; Gaibulloev and Sandler 2008, 2009, 2011; Keefer and Loayza 2008). Such consequences are particularly large for terrorism-plagued countries (Abadie and Gardeazabal 2003; Eckstein and Tsiddon 2004) when compared to the mean or median response for a sample of countries (e.g., Blomberg et al. 2004; Sandler and Enders 2008). In addition, microeconomic consequences of terrorism at the sectoral level have been documented with respect to tourism (Drakos and Kutan 2003; Enders et al. 1992), airline industry (Drakos 2004), foreign direct investment (Abadie and Gardeazabal 2008; Bandyopadhyay et al. 2014; Enders and Sandler 1996), and trade sector (Blomberg and Hess 2006; Nitsch and Schumacher 2004). Today's religious fundamentalist terrorists, who dominate transnational terrorism since 1992 (Enders et al. 2016), are particularly bent on distressing the economies of countries for which they harbor grievances. This is best illustrated by al-Qaida's skyjackings on September 11, 2001 (henceforth, 9/11) that toppled the World Trade Center's towers, an icon of world capitalism, and temporarily for 30-40 days depressed stock exchanges worldwide (Chen and Siems 2004).

To date, there are a small number of studies that empirically studied the effects of terrorism on bilateral trade based on a gravity model, where trade volume increases with the product of the trading countries' economic sizes and decreases with their distance from one another. Gravity models incorporate other trade facilitators (e.g., common language, regional trade agreement, and past colonial relationship) and inhibitors (e.g., landlocked country or

conflict) (Blomberg and Hess 2006; Glick and Rose 2015). Terrorist attacks in trading partners result in larger transaction cost, greater transportation cost, increased uncertainty, lost income, and enhanced business cost (e.g., greater border controls and higher insurance rates) that negatively impact trade (Enders et al. 2006; Nitsch and Schumacher 2004). Past studies generally discovered a significant, but modest, effect of transnational terrorism on overall trade; Mirza and Verdier (2014) showed that a 1% increase in the number of past terrorist events reduced US imports from the terrorist perpetrator's country by 0.01%, while Nitsch and Schumacher (2004) found that a doubling of terrorist attacks in trading partners cut their bilateral trade by almost 4%. Such a doubling may correspond to a large increase in transnational terrorism in some instances. At the monthly level, Egger and Gassebner (2015) discerned no *short-term* effect of transnational terrorism on imports and exports for OECD countries and their trading partners.

Our analysis differs from that of the extant literature in a number of crucial ways. In particular, we estimate the differing effects of transnational and domestic terrorism on trade. Because domestic terrorist attacks far outnumber transnational terrorist attacks (Enders et al. 2011), earlier studies that solely investigated transnational terrorism ignored the potential effect of most terrorist attacks on trade. Our analysis estimates the impact of terrorist attacks on total trade, exports, and imports; except for Egger and Gassebner (2014), previous terrorism studies focused on total trade. In contrast to earlier studies, our study's sample period corresponds solely to the dominance of the religious fundamentalist terrorists during 1995–2012 when terrorist incidents are associated with more casualties and greater intent to adversely affect the economy. For example, Egger and Gassebner (2015) investigated 1970–2008; Blomberg and Hess (2006) examined 1968–1999; and Nitsch and Schumacher (2004) studied 1960–1993. These earlier sample periods include mostly years where the leftist terrorist groups were the

dominant influence (Hoffman 2006; Rapoport 2004). We focus on bilateral trade for a world sample of 151 countries over the period 1995-2012.[1] In contrast to the literature, we distinguish the impact of terrorism on various manufacturing sectors based on skill intensity. Notably, we present an explicit formal model to underlie and inform our empirical estimates.

Our paper is rich in findings. The augmented gravity model's variables possess the anticipated signs and are robust for the myriad specifications including Pooled Cross-Section (PCS) and Country-Pair Fixed Effects (FE) models. For the latter preferred model, both types of terrorism reduce trade of manufactured goods, while they have no significant effect on trade of primary products. Generally, the detrimental effect of transnational terrorist incidents on various measures of manufactured trade is substantially larger than that of domestic terrorist incidents, indicating that transaction cost and other considerations associated with transnational terrorism are more trade inhibiting than those tied to domestic terrorism. Typically, both types of terrorism have a larger negative influence on imports than on exports, which may stem from asymmetric cost considerations involving foreign firms trying to do business in a terror-plagued nation. When manufacturing sectors are decomposed by resource or skill intensities, transnational terrorism continues to have a more pronounced effect on trade than domestic terrorism. There is a general tendency for medium-skilled and higher-skilled manufacturing to sustain a more adverse trade impact from alternative forms of terrorism, with some peaking at a skill level below the greatest.

The remainder of paper has five sections. Some necessary preliminaries – definitions and conceptualizations – are presented in Section 2, followed by the formal theoretical model and its comparative statics in Section 3. Methodology and data are described in Section 4, while the empirical results and their interpretation are discussed in Section 5. Finally, Section 6 indicates

[1] See the online appendix for the descriptive statistics (Table 1A) and for the list of countries (Table 2A).

concluding remarks.

2. Preliminaries

Terrorism is the premeditated use or threat to use violence by individuals or subnational groups to obtain a political or social objective through the intimidation of a large audience beyond that of the immediate victims (Enders and Sandler 2012). This political-inspired violence may be directed at people or property.[2] In the latter instance, terrorist attacks may be intended to cause economic stress on a targeted country. A terrorism campaign may cause a constituency to pressure its government to concede to terrorist demands in order to restore tranquility. Terrorist attacks also induce governments to allocate resources to counterterrorism, which for transnational terrorism creates a need to enhance border protection. This then increases the cost of imports by slowing the flow of trade.

Terrorism comes in two varieties. Domestic terrorism is homegrown and has consequences primarily on the host or venue country, its institutions, citizens, property, and policies. The perpetrators and victims are all citizens from the venue country (Enders et al. 2011). Instances of domestic terrorism include the bombing of the Alfred P. Murrah Federal Building in Oklahoma City by Timothy McVeigh on 19 April 1995; the bombing of Centennial Olympic Park in Atlanta by Eric Robert Rudolph on 27 July 1996; and the package bombing campaign in the United States by the Unabomber from 1978 to 1985. Through its venue, perpetrators, or victims, transnational terrorism involves two or more countries. If the nationality of one or more victims differs from that of the perpetrators, then the terrorist attack is transnational. If, moreover, a victim's or perpetrator's nationality is not that of the venue

[2] Starting in the 1990s, people attacks far outnumbered property attacks (Gaibulloev et al. 2012). Also, transnational terrorist attacks against private parties started to outnumber other target groups (i.e., business, officials, and the military) in 1999 (Brandt and Sandler 2010).

country, then the attack is transnational. The kidnappings and subsequent beheadings of American, British, and Japanese hostages by Islamic State in Iraq and Syria (ISIS) terrorists during 2014 and 2015 constitute transnational terrorist attacks. Domestic terrorist attacks outnumber transnational terrorist attacks by at least six to one, but generally do not have the same economic consequences (Enders et al. 2011; Gaibulloev and Sandler 2008).

Why does terrorism negatively affect trade between trading partners?[3] First, both forms of terrorism increase uncertainty, which raises the cost of traded goods, especially relative to these goods produced in a terrorism-free country. Second, terrorism increases the cost of doing business by raising wages in terrorism-prone industries, augmenting insurance premiums, and increasing security cost, which decreases the competitiveness of goods, produced where terrorism is present. Third, terrorism, especially of the transnational kind, slows the flow of goods and resources owing to greater inspections and safeguards. Fourth, trade can be reduced from losses in income or assets that result from terrorist attacks. Fifth, terrorism can divert government expenditures from more productive public investment to less productive security activities, thereby reducing economic growth, export production, and import demand (Blomberg et al. 2004; Blomberg and Hess 2006). This diversion is practically onerous for transnational terrorism, where not only borders must be protected, but also military power may have to be projected to a foreign country that harbors a terrorist group.

Terrorism is likely more problematic for imports than for exports, the latter of which are produced at home. Terrorism coming from a trading partner or occurring in a trading partner requires more safeguards of all imports from this partner, because weapons and operatives may come via a third country. The 9/11 attacks caused the United States to scrutinize shipping containers from all trading partners, not just those experiencing terrorism (Enders and Sandler

[3] Not all of these reasons are captured by our theory.

2012, Chapter 11). These extra security measures raised the cost of all imports. US exports are less scrutinized by its trading partners, since there is no significant transnational terrorist group in resident. This security asymmetry can result in forces that reduce imports relative to exports as foreign firms face greater cost from doing business in a terrorism-afflicted nation, as shown in Section 3.

3. Theoretical model: effects of terrorism on bilateral trade

We adapt the model of Helpman et al. (2008) to the analysis of the effects of terrorism on trade flows.[4] Consumers in nation j $\left(j=1,...,J\right)$ consume a continuum of products, indexed by k, where the set of available products is B^j. The standard utility function that characterizes consumers' preferences in nation *j* is:

$$U^j=\left[\int_{k\in B^j} x^j\left(k\right)^{\frac{\varepsilon-1}{\varepsilon}}dk\right]^{\frac{\varepsilon}{\varepsilon-1}},\quad \varepsilon>1, \tag{1}$$

where ε is a constant elasticity of substitution between products, while $x^j\left(k\right)$ is the consumption of product *k* in nation *j*. Standard utility maximization yields the demand function,

$$x^j\left(k\right)=\frac{p^j\left(k\right)^{-\varepsilon}Y^j}{\left(P^j\right)^{1-\varepsilon}}, \tag{2}$$

where Y^j is nation *j*'s total expenditure (income) and P^j is its aggregate price index, such that

$$P^j=\left[\int_{k\in B^j} p^j\left(k\right)^{1-\varepsilon}dk\right]^{\frac{1}{1-\varepsilon}}. \tag{3}$$

Marginal input cost of any good produced in nation *i* is a constant c^i, while productivity of firm *k* is $a\left(k\right)$, so that the firm's marginal production cost is $c^i/a\left(k\right)$. An exporting firm

[4] Also see Lawless (2010) for a model along similar lines.

also incurs an iceberg transportation cost, where for each unit exported to nation *j*, the firm needs to produce $\tau^{ij}\left(>1, i \neq j; \tau^{ii}=1\right)$ units, since $\tau^{ij}-1$ units melt away in transportation. We assume that this transportation cost is affected by transnational, rather than domestic, terrorism, because transportation networks between trading nations involve citizens of both nations, some of whom may have transnational terrorist connections. Accordingly, transportation cost is assumed to rise with greater transnational terrorism (ρ^i in nation *i*) in either of two trading nations, such that

$$\tau^{ij}=\tau^{ij}\left(\rho^i,\rho^j\right),\ \ \tau^{ij}_{\rho^i}>0\text{, and }\tau^{ij}_{\rho^j}>0. \tag{4}$$

Following Melitz (2003) and Helpman et al. (2008), we assume that there is a fixed cost, F^{ij}, for a firm from nation *i* to export to nation *j*. This cost is likely to be affected by transnational terrorism in the destination market. For example, a Japanese car maker that wants to sell in India must set up dealerships in Indian cities. Terrorist attacks that affect such dealerships involve domestic and foreign interests, thereby making these attacks transnational. Hence, we have

$$F^{ij}=F^{ij}\left(\rho^j\right). \tag{5}$$

The profit, π^{ij}, of a firm in nation *i* that exports to nation *j* is

$$\pi^{ij}=p^j(k)x^j(k)\ \ \frac{c^i}{a(k)}\tau^{ij}\left(\rho^i,\rho^j\right)x^j(k)\ \ F^{ij}\left(\rho^j\right), \tag{6}$$

where $x^j(k)$ is the level of exports by this firm. The demand function in Eq. (2) implies that this firm perceives its price elasticity of demand in the export market as ε. Hence, equating marginal revenue and marginal cost gives the profit-maximizing export and price levels as:

$$p^j(k)\left(1-\frac{1}{\varepsilon}\right)=\frac{c^i}{a(k)}\tau^{ij}\left(\rho^i,\rho^j\right)\ \ p^j(k)\ \ \frac{\varepsilon c^i\tau^{ij}\left(\rho^i,\rho^j\right)}{(\varepsilon-1)a(k)}\ \ p^j\left(k;\rho^i,\rho^j\right). \tag{7}$$

Substituting Eq. (7) in Eq. (2), we obtain the volume of export of nation *i*'s firm *k* to nation *j*. Furthermore, the export revenue of this firm is

$$R^{ij}\left(a(k);\rho^i,\rho^j,P^j,Y^j\right)=p^j\left(k;\rho^i,\rho^j\right)x^j(k)\left[\frac{p^j(\cdot)}{P^j}\right]^{1-\varepsilon}Y^j. \tag{8}$$

Using Eqs. (7)-(8) in Eq. (6), we can express firm *k*'s profit from exports to nation *j* as:

$$\pi^{ij}\left(k,\delta^i,\delta^j,\rho^i,\rho^j,P^j,Y^j\right)=\left(\frac{c^i\tau^{ij}(\cdot)}{a(k)}\right)^{1-\varepsilon}\cdot\frac{\mu Y^j}{\left(P^j\right)^{1-\varepsilon}}\quad F^{ij}(\,), \text{ where } \mu=\varepsilon^{-\varepsilon}(\varepsilon-1)^{\varepsilon-1}. \tag{9}$$

Positive (or zero) export profit (i.e., $\pi^{ij}\geq 0$) can be obtain if and only if

$$a\geq\tilde{a}^{ij}\left(\rho^i,\rho^j,P^j,Y^j\right)=\frac{c^i\tau^{ij}\left(\rho^i,\rho^j\right)}{P^j}\left(\frac{F^{ij}\left(\rho^j\right)}{\mu Y^j}\right)^{\frac{1}{\varepsilon-1}}, \tag{10}$$

where $\tilde{a}^{ij}(\cdot)$ is the minimum (or threshold) productivity level, required for *i*'s domestic firm to profitably export to country *j*. Firms below this threshold sell only in the domestic market.[5] The productivity of firms is adversely affected by the incidence of both domestic and transnational terrorism at home (Sandler and Enders 2008). Denoting domestic terrorism by δ^i, we define a probability density function $g\left(a;\delta^i,\rho^i\right)$ with support $(0,\infty)$ to represent firms' productivity distribution in country *i*. Adverse productivity effects are represented by leftward shifts of the density function due to an increase in δ^i or ρ^i. For a given mass of firms, $\bar{N}_i$, aggregate export revenue of nation *i* from exporting to nation *j* is

$$\tilde{R}^{ij}\left(\rho^i,\rho^j,\delta^i,P^j,Y^j\right)=\int_{\tilde{a}^{ij}}^{\infty}R^{ij}\left(a;\rho^i,\rho^j,P^j,Y^j\right)\bar{N}_i g\left(a;\delta^i,\rho^i\right)da. \tag{11}$$

Using Eq. (7) in Eq. (3), and noting that domestic terrorism of trading partners affect the

[5] As in Helpman et al. (2008), we assume that there are no fixed costs to selling in the domestic market. If price exceeds marginal cost, profits are positive and all firms sell in their domestic market.

productivity distribution of their respective domestic firms,[6] we denote the aggregate price level in country *j* as:

$$P^j = \left[\int_{k\in B^j} p^j(k)^{1-\varepsilon}\, dk\right]^{\frac{1}{1-\varepsilon}} \quad P^j\left(\rho^i, \rho^j, \delta^i, \delta^j\right), \tag{12}$$

where aggregate price is increasing in all its arguments.[7] Substituting Eq. (12) into Eq. (11), we have

$$\tilde{R}^{ij} = \int_{\tilde{a}^{ij}}^{\infty} R^{ij}(\,)\,\bar{N}_i\, g\left(a;\delta^i,\rho^i\right) da \quad \tilde{R}^{ij}\left(\rho^i,\rho^j,\delta^i,\delta^j,Y^j\right). \tag{13}$$

Eq. (13) can yield a form of the gravity equation that involves incomes and terrorism parameters of both nations *i* and *j*.[8] Eq. (13) provides an expression for bilateral trade flows in both directions, because $\tilde{R}^{ij}$ is the export flow from *i* to *j*, while $\tilde{R}^{ji}$ represents the export flow in the other direction. The latter denotes *i*'s import expenditure on *j*'s goods. Differentiating Eq. (13) with respect to a change in any terrorism-related parameter θ, we get

$$\frac{\partial \tilde{R}^{ij}(\cdot)}{\partial\theta} = \bar{N}_i \int_{\tilde{a}_{ij}}^{\infty} \frac{\partial R^{ij}(a)}{\partial\theta} g(\cdot)\, da + \bar{N}_i \int_{\tilde{a}_{ij}}^{\infty} R^{ij}(a) \frac{\partial g\left(a;\delta^i,\rho^i\right)}{\partial\theta} da \quad \bar{N}_i R^{ij}\left(\tilde{a}_{ij}\right) g\left(\tilde{a}_{ij};\delta^i,\rho^i\right) \frac{\partial \tilde{a}_{ij}}{\partial\theta}. \tag{14}$$

The first term on the right-hand-side of Eq. (14) is the change in the value of exports due to the effect of terrorism on export revenues of existing exporting firms at given productivity levels. The second term is the change in exports due to a decline of productivity levels [i.e., a leftward shift of $g(\cdot)$]. The last term is the change in exports due to the entry (or exit) of country *i*'s exporting firms into (from) country *j*'s market because of greater terrorism-related costs. Expression (14) is quite general, but rather opaque in terms of empirical predictions. To throw more light on these predictions, we evaluate this expression for specific cases.

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[6] For clarity of exposition, we abstract from terrorism in other countries.
[7] This can be shown by differentiating Eq. (12). The derivations are available from the authors upon request.
[8] The derivation follows the method used in Appendix II of Helpman et al. (2008).

3.1 *Domestic terrorism*

We first investigate how an increase in domestic terrorism in *i* affects export revenues from country *j*. The aggregate price level in *j* includes prices from that nation's firms as well as prices from all its trading partners, so that a change in the price of *i*'s exports is unlikely to have a major impact on the aggregate price level P^j. Using this fact in Eq. (10), we can see that the cutoff productivity level $\tilde{a}^{ij}(\cdot)$ is not affected by domestic terrorism, so that we can ignore the last term of Eq. (14). From Eq. (7), it is clear that, at a given productivity level a, the export price p^j is also independent of *i*'s domestic terrorism. Thus, the relative price $p^j(\cdot)/P^j$ is unaffected, which by Eq. (8) implies that R^{ij} is unaffected. In turn, this means that we can ignore the first term of Eq. (14) as well. Therefore, the sole effect of *i*'s domestic terrorism is

$$\frac{\partial \tilde{R}^{ij}(\cdot)}{\partial \delta^i} = \bar{N}_i \int_{\tilde{a}_{ij}}^{\infty} R^{ij}(a) \frac{\partial g\left(a;\delta^i,\rho^i\right)}{\partial \delta^i} da\,. \tag{15a}$$

As domestic terrorism rises, productivity levels of domestic firms drop, shifting the probability density function to the left, such that

$$\frac{\partial \tilde{R}^{ij}(\cdot)}{\partial \delta^i} < 0\,, \tag{15b}$$

which means that domestic terrorism in *i* reduces its export revenues from *j*.[9]

Next consider the influence of an increase of *j*'s domestic terrorism on *i*'s export revenues. Productivity in nation *i* is not affected by domestic terrorism in nation *j*, and hence by Eq. (7) we infer that prices of *i*'s exports to *j* are not affected. However, prices of products of *j*'s firms for their own market must rise as their productivity shifts lower due to domestic

[9] The proof is based on first-order stochastic dominance, where the productivity distribution after a rise in terrorism is stochastically dominated by the distribution prior to the rise.

terrorism,[10] which raises price index P^j.[11] Export revenues of *i*'s firms from sales in *j* must rise, because the relative price of their exports falls [see Eq. (8)], and hence the first term of Eq. (14) is positive. There is no effect of nation *j*'s domestic terrorism on nation *i*'s productivity, so the second term vanishes. Finally, Eq. (10) suggests that a rise in P^j reduces $\tilde{a}^{ij}$, allowing for more firms in *i* to enter *j*'s market. This implies a positive contribution from the third term in Eq. (14). In sum, a rise in *j*'s domestic terrorism will raise *i*'s export revenues $\tilde{R}^{ij}$. This last statement is equivalent to saying that a rise in *i*'s domestic terrorism increases the value of its imports from nation *j*, which is the same as nation *j*'s export revenues from nation *i* (i.e., $\tilde{R}^{ji}$). At given income levels, greater domestic terrorism reduces the country's export revenues and raises its import expenditure. If however, its trading partner experiences a similar rise in domestic terrorism, these effects may be partially or completely offset.

3.2 *Transnational terrorism*

From Eq. (7), an increase in *i*'s transnational terrorism, ρ^i, raises *i*'s export price p^j through the transportation cost τ^{ij}. Recalling that nation *i*'s exports is likely a small subset of all products in *j*'s market, we can ignore the effect on the price index P^j. Thus, the relative price of *i*'s exports in *j*'s market, $p^j(\cdot)/P^j$ rises, which reduces *i*'s export revenues from *j* [Eq.(8)]. Accordingly, the first term in Eq. (14) is negative. The second term is negative too because productivities of *i*'s firms will be reduced by ρ^i. Finally, from Eq. (10), $\tilde{a}^{ij}$ must rise as transportation cost rises. In other words, fewer firms from *i* can export, implying a negative third term in Eq. (14). Thus,

[10] In this model, all prices are inversely related to productivity, given constant markups above respective marginal costs. Thus, as productivity in nation *j* falls, prices of goods produced by its domestic firms must rise.

[11] Domestic firms in any nation do not face fixed cost of selling in their own market. Hence, there is a bias toward domestic firms' products in the price index, and hence the effect of *j*'s firms on P^j need not be negligible.

a rise in ρ^i reduces nation *i*'s bilateral export revenues from nation *j*.

Next, we turn to the influence of transnational terrorism in *j* on *i*'s export revenues. A rise in ρ^j must raise *i*'s export price by increasing the transportation cost τ^{ij} [see Eq. (7)]. Also nation *j*'s own firms' productivities will fall, thereby raising prices for their domestic market. These effects will contribute to a rise in P^j. If the productivity-induced effect (which affects only *j*'s own firms) is relatively small, and noting that P^j includes prices of imports from many terror-free nations, the rise in P^j will be small. This means that the relative price of exports for nation *i* [i.e., $p^j(\cdot)/P^j$] rises, reducing its export revenues, so that the first term in Eq. (14) is negative. The second term vanishes because ρ^j has no effect on the productivities of *i*'s firms. Finally, $\tilde{a}^{ij}$ increases as both fixed cost and transportation cost tend to increase for nation *i* due to greater transnational terror in nation *j*. This may be offset a bit due to a rise in P^j, but for reasons discussed above, this effect may be of second-order importance. Hence, the last term in Eq. (14) is likely to be negative too. Therefore, a rise in transnational terrorism in nation *j* is likely to reduce *i*'s exports to *j*. Alternately, an increase in *i*'s transnational terrorism reduces its imports from *j*.

There is a clear asymmetry of trade effects between domestic and transnational terrorism, which dominates our subsequent empirical findings. Domestic terrorism has less pronounced or clear-cut negative influence on bilateral trade than transnational terrorism. The former acts against bilateral trade through a single channel, whereas transnational terrorism negatively impacts bilateral trade through multiple channels. This is particularly true when trading dyads both experience transnational terrorist events.

The preceding discussion highlights the effect of transnational terrorism on bilateral trade. What is critical in this discussion is the respective elasticities of the transportation cost

function τ^{ij} (or τ^{ji}) and the fixed cost function F^{ij} (or F^{ji}) with respect to transnational terrorism. For example, if transportation infrastructure is sufficiently protected such that it is largely immune to transnational terrorism, then ρ^i (or ρ^j) has minimal effect on τ^{ij} (or τ^{ji}). Following our earlier analysis, this suggests that such terrorism has limited effect on exports. However, fixed cost of marketing *i*'s products in *j* (F^{ij}) is likely to be sensitive to transnational terrorism, as nation *i*'s personnel or assets are directly under the threat of transnational terrorism in *j*. We can also infer that this will reduce imports into nation *j* by reducing the number of foreign firms that export to *j*. However, to the extent that imports from terror-free nations may have lower transportation cost (although not lower fixed cost), there may be some shifting of *j*'s imports from terror-prone sources to terror-free sources. To some degree, this may alleviate the effect of terrorism on aggregate multilateral imports of a nation relative to bilateral imports between two terror-afflicted nations. *Ceteris paribus*, the greater the terrorism elasticity of the fixed cost in a nation *i*, and the lower the terrorism elasticities of transportation cost between a pair of trading nations *i* and *j*, the greater the likelihood that bilateral exports of nation *i* (to nation *j*) are less affected by terrorism compared to its bilateral imports.

3.3 *On skill intensity*, *terrorism*, *and trade*

Our model does not explicitly deal with the role of skill intensity of products. However, it is reasonable to assume that labor-skilled dependent industries are likely to locate in more urban areas and draw on a network of domestic and foreign workers. This is likely to make more skill-intensive industries' productivity distribution $g\left(a;\delta^i,\rho^i\right)$ more elastic with respect to both forms of terrorism, but perhaps more so for transnational terrorism. In other words, a rise in ρ^i is apt to lead to a larger leftward shift of the productivity distribution of *i*'s firms when the industry is

more skill intensive. This shift intensifies the trade-reducing effects through productivity changes discussed above. Thus, one may expect a greater effect of transnational terrorism on more skill-intensive sectors. This empirical hypothesis is later addressed.

4. Methodology and data

4.1. Traditional Gravity Model

In the empirical trade literature, the gravity model is used extensively for estimating the impact of a variety of policy implications, such as currency unions, trade agreements, patent rights, and political blocs. The general formation of a trade gravity model includes the following multiplicative terms:

$$X_{ij} = GS_{ij}M_{ji}\theta_{ij}, \tag{16}$$

where X_{ij} is the monetary value of trade between countries *i* and *j*. *G* indicates the influence of global factors, such as world trade liberalization, that does not depend on *i* and *j*. S_{ij} indicates all exporter-specific factors that influence country *i*'s exports supplied to country *j*, and M_{ji} represents all importer-specific factors that affect country *j*'s imports demanded from country *i*. θ_{ij} denotes myriad factors associated with bilateral trade cost. In traditional gravity models, most of these bilateral relationships and costs are captured using dummy variables. Thus, we first employ a PCS model with time dimension to identify the impact of different types of terrorism on trade by main trade components (i.e., primary commodities and manufacture goods) and by skill composition within manufacturing. The following model is estimated using

the OLS method with robust standard errors clustered at country-pair level:[12]

$$\begin{aligned}\ln Trade_{ijt} = {} & \alpha + \alpha_t + \beta \ln[(1+T)_{i,t-1} \cdot (1+T)_{j,t-1}] + \gamma_1 \ln(RGDP_{it} \cdot RGDP_{jt}) + \gamma_2 \ln(RGDP_{it}/P_{it} \cdot RGDP_{jt}/P_{jt}) \\ & + \gamma_3 Border_{ij} + \gamma_4 Language_{ij} + \gamma_5 \ln(Dis)_{ij} + \gamma_6 Llock_{ij} + \gamma_7 RTA_{ijt} + \gamma_8 CUR_{ijt} + \gamma_9 Colony_{ij} \\ & + \gamma_{10} CommonColony_{ij} + \gamma_{11} Island_{ij} + e_{it}, \end{aligned} \quad (17)$$

where *i* and *j* denote countries, and *t* denotes time. $Trade_{ijt}$ indicates real exports plus imports between *i* and *j* at time *t*. The effect of different types of terrorism (*T*) is separately estimated for total product trade, primary commodities, manufactured goods, and for a host of other trade variables in the category of manufactured goods, produced using varying degrees of resource intensities. The same effect is also examined separately for exports and imports. This allows us to capture the sensitivity of domestic production and demand for foreign goods in response to terrorism risk under varying sets of local environmental conditions. α_t indicates year dummies to account for the impact of global economic shocks on the trade-terrorism relationship for a given year in a country.

Our bilateral data for total product trade, primary commodities trade, and manufactured goods trade come from the online statistics of United Nations Conference on Trade and Development (UNCTAD 2014). These data present merchandise trade in thousands of dollars by trading partners and products, based on SITC Revision 3 commodity classification. UNCTAD secretariat carried out calculations to present the data in its final form based on the information assembled by the UN COMTRADE and the IMF's Direction of Trade Statistics. A unique feature of this dataset is that it also contains information on exports and imports of manufactured goods, produced using varying degree of factor intensities: (i) labor-intensive and resources-intensive goods, (ii) low-skilled and technology-intensive goods, (iiia) medium-skilled

[12] Initially, we also considered separately deriving results for developed and developing countries; however, we dropped this idea because those results can only reflect a fraction of a country's total trade by leaving out trade between developed and developing countries.

and technology-intensive goods, (iiib) medium-skilled electronic goods, excluding parts and components, (iiic) medium-skilled parts and components of electrical and electronic goods, (iva) high-skilled and technology-intensive goods, (ivb) high-skilled electronics, excluding parts and components, and (ivc) high-skilled parts and components of electrical and electronic goods. We converted these nominal values into real values (constant at year 2000) by dividing each country's exports and imports by its export value index and import value index, respectively. Data for these two indices are taken from the *World Development Indicators* of the World Bank (2014).

Our terrorism event data are drawn from the Global Terrorism Database (GTD), which records domestic and transnational terrorist incidents (National Consortium for the Study of Terrorism and Responses to Terrorism 2014). GTD draws its data from media accounts and, in so doing, indicates key variables for each terrorist incident that include incident date, venue country, victim nationality (up to three per attack), number of casualties (i.e., deaths or injuries), and other characteristics. GTD does not record the nationalities of perpetrators for transnational attacks; hence, we cannot match such attacks to an origin country. Until 2013, GTD did not decompose terrorist incidents into domestic and transnational incidents; hence, we rely on the partitioning of terrorist incidents into domestic, transnational, and ambiguous attacks, devised by Enders et al. (2011). These authors engineered a five-step procedure, based on the nationality of the victims, target types (e.g., diplomatic target, nongovernmental organization, and multilateral institution), targeted entities, US-specific attacks, and the venue country, to distinguish between domestic and transnational terrorist attacks. Their decomposition of the GTD data is much more complete than the one later devised by GTD in 2013, which is based, in part, on Enders et al.'s (2011) procedure. For example, Enders et al.'s (2011) decomposition has about 12% of "ambiguous" incidents that could not be pigeon-holed into domestic or transnational attacks,

while GTD has over 30% of incidents that could not be unambiguously classified. For 1995–2012,[13] we derive annual counts for domestic and transnational terrorist events for each sample country, because our unit of analysis is that of a country-year.

In Eq. (17), the coefficient of primary interest is β, which represents the partial trade impact of terrorism. Based on the information in the GTD dataset, we construct two terrorism variables: the number of domestic and transnational terrorist attacks.[14] Both terrorism measures are continuous variables that provide a significant heterogeneity across countries and variation across time. We treat terrorist incidents equally without accounting for their severity; however, the number of terrorist-related casualties provides qualitatively similar results (available upon request). We believe that the distinction by terrorism types offers a more informative analysis of their trade consequences, especially because transnational terrorist incidents can affect trade flows differently than domestic terrorist incidents. In order to ensure that terrorism risk is captured in both trading partners, we take log of 1+ terrorist incidents in country *i times* 1 + terrorist incidents in country *j*, where both terms are evaluated at time $t - 1$. The addition of one ensures that taking log does not drop any observation with a zero count. For clarity, let us assume that country *i* is Pakistan, which experienced lots of terrorism over the sample period, and that country *j* is United Arab Emirates (UAE), which experienced little terrorism over the sample period. Then, all else equal, trade between the two may be mainly influenced by the terrorism risk in Pakistan. Civil conflict may also affect the trade-terrorism relationship. However, any influences of civil conflict are assumed to be captured by country-specific dummies in our model.

Although taking current values of terrorist incidents provides similar results (available

[13] GTD drastically changed its coding conventions for incidents occurring in 2013 and 2014, which resulted in much greater incident counts than in other recent years. Thus, we thought it prudent not to include these two years.
[14] We also performed runs for total terrorism by summing domestic, transnational, and ambiguous attacks, which are available upon request – the results are similar to those for just domestic terrorism.

upon request), we prefer displaying results when terrorist incidents are lagged by one year. This strategy reduces contemporaneous correlation between trade and terrorism. Moreover, using the lagged terrorism variable is more sensible since terrorism-induced trade consequences through various channels are apt to take effect with some lag.

Data for all other variables in Eq. (17) are taken from Glick and Rose (2015). These variables are defined as follows: *RGDP* is real gross domestic product, *P* is population, *Border* is a dummy variable for whether the countries share a common border, *Language* is a dummy variable for whether the countries share a common language, and *Dis* is the log of distance between trading countries. Moreover, *Llock* is a dummy that equals 1 if a trading country is landlocked and 0 otherwise, *RTA* is a dummy variable that equals 1 if both trading countries belong to the same regional trade agreement and 0 otherwise, *CUR* is a dummy variable that equals 1 if both countries use the same currency and 0 otherwise, *Colony* and *Common Colony* are dummy variants that equals 1 for either of these two colonial heritage aspects and 0 otherwise, and *Island* is a dummy variable that equals 1 if a trading country is an island and 0 otherwise.[15] Note that *RTA* and *CUR* reflect the change from 0 to 1 in the year when a country entered a trade agreement or started using the same currency, respectively.

4.2. Gravity Model with Country-Pair Fixed Effects

Anderson and van Wincoop (2003) show that a well-specified gravity model is crucial for capturing relative trade costs between trading partners. They argue that relative trade costs, i.e., country *j's* propensity to import from country *i* is determined by *j's* trade costs with *i*, relative to its overall weighted average trade costs of imports. They label this phenomenon as the

[15] As elaborated in Glick and Rose (2015, p. 4), currency union means that money between two countries was interchangeable at 1:1 par for an extended period of time, so that there is no need to convert prices for trade between them. By transitivity rule, if dyads x-y and x-z are in currency unions, then y-z is a currency union.

"multilateral trade resistance" (MTR) term, which is faced by every country in the world. For example, US-Norway trade is affected by the specific trade barrier between them, relative to the average trade barrier each of them face with other countries in the world.

Although both the time-varying and time-invariant factors largely capture most of the MTR term in Eq. (17), they do not account for all unobserved factors because of heterogeneity at each country-pair level. Comparing various specifications of the gravity model, Cheng and Wall (2005) state that, while the PCS model is employed in nearly all gravity models, the PCS model fails to capture many considerations that may influence bilateral trade. The variant of historical, cultural, ethnic, political, or geographical factors that affect the level of bilateral trade can be correlated with the right-hand-side variables. Since we have a total of 10,596 country-pair dyads in our dataset, ignoring country-pair fixed effects will not only result in biased estimates, but will also overestimate the impact of terrorism on trade. Thus, our fully-specified gravity model takes the following form:

$$\ln Trade_{ijt} = \alpha + \alpha_t + \alpha_{ij} + \beta \ln[(1+T)_{i,t-1} \cdot (1+T)_{j,t-1}] + \gamma Z + e_{it}, \quad (18)$$

where α_{ij} represents country-pair fixed effects for each trading partner. Because these fixed effects accounts for all sorts of unobserved heterogeneity bias, all time-invariant variables are automatically dropped from the regressions.[16] Thus, vector *Z* only retains time-variant variables, i.e., real GDP, real GDP per capita, regional trade agreement, and currency union.

One may argue that trade may influence the likelihood of terrorism in a country, so that taking lagged value of terrorism may not appropriately address the reverse-causation problem. If, for example, trade can boost domestic production and employment, then trade may mitigate economic-related grievances that may fuel terrorism. Moreover, trade-induced economic activity

[16] We implemented *xtreg* command in Stata 13.

increases individuals' opportunity costs of engaging in terrorism. Counter to this argument, the empirical literature finds no robust evidence supporting that socio-economic factors, such as lack of education or employment, spur terrorism in a country.

Nonetheless, we test whether our results are robust to treating such endogeneity bias. The conventional strategy to address endogeneity is to employ instrumental variable methods. However, finding unique instruments for both types of terrorism given our multiple trade dependent variables is an insurmountable task. Moreover, the validity of the instruments may always be called into question. Thus, in lieu of the instrument approach, we conduct a number of placebo tests. In particular, we re-estimate all regressions by randomly rearranging terrorism variables for each country-pair, while maintaining all other control variables. Of course, there are an infinite number of ways that one may reshuffle terrorism data for each country-pair. To show that the results are not artifacts of a particular statistical procedure, we try a number of ways through which terrorism data for each country-pair can be reshuffled. For example, in one of several cases, we divide all country-pairs into three parts and reshuffled terrorism data for one-third of country-pairs randomly. The idea of this exercise is that if our assumed causal direction is correct, then our "false" setup of repositioning terrorism variables for each country-pair should seldom reveal any statistically significant and negative effects of terrorism on trade.

5. Results

For total trade (exports plus imports), Table 1 indicates the effects of last year's domestic terrorist attacks on trade in all products, primary commodities, and manufactured goods.[17] The sum of the number of trading pairs for the 18 sample years determines the varying number of

[17] Since results for total and domestic terrorism are almost identical, we only report results for the latter. However, results for total terrorism are available upon request.

observations.

[Table 1 near here]

The results of the PCS model (columns 1-3) show that lagged domestic terrorism has negative and significant effects on the trade of all products, primary commodities, and manufactured goods. These terrorism coefficients' magnitudes show that for trading partners, a one percent change in last year's domestic terrorism results in a 0.118 percent reduction in all products trade, a 0.101 percent reduction in primary commodities trade, and a 0.117 percent reduction in manufactured goods trade. This follows because the double log form means that the coefficients are elasticities.

The gravity variables are robust over all PCS models with the anticipated signs. The estimated coefficients of the log product of real GDP of trading dyads are positive and significant, with elasticities that range from 1.053 to 1.189. For the log product of real GDP per capita, the size of the coefficients ranges from 0.038 to 0.212. The estimated positive coefficients of common borders and common language indicate trade facilitation, while the negative coefficients of dyadic distance indicate trade inhibition; both findings are consistent with the augmented gravity model's prediction. The results show that trading dyads including a landlocked country are less likely to trade in contrast to trading dyads including an island country. Regional trade agreements greatly promote trade among trading partners, with manufactured goods displaying the largest impact. Currency union coefficients also foster trade in the three PSC models, but the elasticity is smaller than for regional trade agreements. Finally, colonial relationship and common colonizer among trading dyads promote trade.

In columns 4-6 of Table 1, we include country-pairs fixed effects to account for all types of unobserved influences of trade at each trading partner level. The negative coefficients of domestic terrorism remain significant at the 0.01 level for trade in total products and

manufactured goods trade, but these coefficient sizes are greatly reduced, as anticipated, to 0.015 and 0.029, respectively. Domestic terrorism's coefficient for primary products becomes statistically insignificant. In the three models, both the real GDP product and the real GDP per capita product terms display positive influences on trade as anticipated in a gravity model. Regional trade agreement has the anticipated positive sign for the three country-pair fixed effects models, while currency union is only positive and significant for primary goods.

The results for transnational terrorism in Table 2 for PCS and country-pair FE models are both quantitatively and qualitatively similar to the results for domestic terrorism. The transnational terrorism coefficient indicates that a one percent increase in these terrorist incidents decreases trade of manufactured goods for the PCS model by 0.180 percent and for the country-pair FE model by 0.026 percent. Like domestic terrorism, the influence of transnational terrorism on primary products trade is insignificant for the country-pair FE model. These findings indicate two important lessons. First, gravity models that do not account for heterogeneity bias at each trading partner level overestimate the impact of terrorism on trade. Second, the negative impact of terrorism on trade is from terrorism's harmful effect on trade of manufactured goods, but not but not from its harmful effect on trade of primary products. Countries are unresponsive to terrorism's impact on primary products because there are often fewer alternative sources of supply for many primary products. Given these two lessons, we only report the results using the country-pair FE model in the regressions to follow.

[Table 2 near here]

Table 3 drills down deeper to distinguish the impact of the two forms of terrorism on exports and imports for 151 sample countries by dyadic trading partners. The number of observations varies according to the number of trading partners for the six models. A one

percent increase in domestic terrorism reduces manufactured exports (imports) by 0.013 (0.021) percent, while a one percent increase in transnational terrorism reduces manufacture exports (imports) by 0.007 (0.032) percent; but, the impact of the latter on manufactured exports is insignificant. This implies that both types of terrorism have a larger detrimental influence on manufactured imports than exports. The larger influence of terrorism on manufactured imports than on manufactured exports agrees with our earlier theoretical development. The effects of both types of terrorism on exports and imports of primary products are insignificant. The gravity controls are robust in the predicted direction, but are suppressed in Table 3 and subsequent tables to conserve space.

[Table 3 near here]

Next, we disaggregate manufactured goods by resource intensity in terms of eight categories as listed in the columns of Table 4, where skill intensity increases in moving from left to right. The three panels of Table 4 display the effects of the two types of terrorism on total trade (Panel A), exports (Panel B), and imports (Panel C). For total trade, domestic terrorism has a significant negative impact on five of the eight categories of resource-intensive sectors, while transnational terrorism has a significant negative impact on all eight sectors. Moreover, consistent with our theory, transnational terrorism generally exerts a larger impact than domestic terrorism. In some instances of total trade, medium-skilled and high-skilled sectors display a slightly more negative impact than labor-intensive or low-skilled sectors, consistent with our theoretical conjecture. However, the nonlinearity of the impact by skill intensity is not captured by our theoretical model. Both forms of terrorism have similar harmful consequences on trade of manufactured exports, with some medium-skilled sectors showing the greatest harm. The harm on export trade from transnational terrorism is most pronounced for the two highest skill levels. For imports, transnational terrorism has a greater negative consequence, which can be more than

double that of domestic terrorism in most regressions. Transnational terrorism displays harmful effect on import trade in six of the eight sectors, while domestic terrorism displays a harmful effect on import trade in three of the eight sectors. In general, there is some tendency for medium-skilled and high-skilled manufacturing sectors trade to be more adversely affected by terrorism, which in recent times is staged in populated centers that host such sectors. Furthermore, more skill-intensive sectors may take longer to recover from terrorist attacks and may incur more cost from these attacks.

[Table 4 near here]

Our formal theory predicts that transnational terrorism is anticipated to have a greater adverse impact than domestic terrorism on trade by raising transportation and fixed costs owing to greater border security and business expense as well as reduced competitors. Part of this cost involves the consequent slower transit of goods. In Table 5, we calculate a country's reduction in manufactured goods trade in real dollar value. To do so, we convert the elasticity coefficients of domestic (transnational) from the country-pair FE models in Tables 1, 2, and 3 into dollar terms using average values. For total manufactured trade, exports, and imports, these domestic (transnational) coefficients equal –0.029 (–0.026), –0.013 (–0.07), and –0.021 (–0.032), respectively. For comparison purpose, we report these losses on an average yearly basis over the period of 1995–2012 for a variety of representative countries. For example, a one percent increase in domestic (transnational) terrorism reduces total manufactured trade for an average (representative) country, Pakistan, India, Nigeria, and Spain by 14.14 (12.68), 3.82 (3.42), 18.16 (16.28), 2.18 (1.95), and 55.26 (49.55) million dollars, respectively. Interestingly, the average numbers of domestic (transnational) terrorist incidents per year faced by an average country, Pakistan, India, Nigeria, and Spain have been 7.6 (1.2), 188.6 (12.7), 151.7 (6.7), 40.4 (5.6), and 24.4 (1.6), respectively. Since these countries' ratio of domestic to transnational terrorist

incidents ranges between 6.3 and 22.6, a one percent increase in transnational terrorism would be a much smaller in terms of incident numbers. To put this into a more meaningful context, we also calculate these losses in terms of one additional terrorist incident. Columns 4 and 5 show that one incident of domestic (transnational) terrorism depresses total manufactured trade for an average country, Pakistan, India, Nigeria, and Spain by 187.01 (1030.54), 2.02 (26.95), 11.97 (293.04), 5.39 (34.83), and 226.12 (3077.4) million dollars, respectively. Moreover, transnational terrorism has a much greater per incident impact than domestic terrorism. Clearly, terrorism has a real dollar impact on trade, which is masked by the small elasticities. Spain is a clear outlier because its trade in manufactured goods sector is so large, so that a small percentage change in terrorism results in a large adverse marginal effect on trade. Spain's asylum policy means that even a single transnational terrorist incident can create significant losses in terms of overall trade, exports, and imports. Over this period, Spain experienced some large terrorist incidents that require countermeasures that slow trade. In all of our five cases, import losses are much larger than export losses from the two forms of terrorism, consistent with the theory.

[Table 5 near here]

In Table 5, losses to manufactured exports and imports indicate the similar conclusion that transnational terrorism is much more harmful than domestic terrorism. The identification of transnational terrorism as a more detrimental marginal inhibitor of trade relative to domestic terrorism is unique to our study. However, domestic terrorism may have a greater *total* detrimental effect on trade since domestic terrorist attacks far outnumber transnational terrorist attacks. Again, the detrimental effect of both forms of terrorism is significant on manufactured goods only, which likely correspond to a lack of response for primary commodities trade owing to fewer alternative sources of supply. As in Tables 1 and 2, the gravity variables come in as predicted in a very robust fashion. Notably, there is little difference between corresponding

gravity coefficients for domestic and transnational terrorism.

Finally, we run a number of placebo tests to support our presumed direction of causality. Tables 6 and 7 apply the falsification tests, as mentioned in Section 4. The first involves trade of all products, primary commodities, and manufactured goods, and the second concerns trade of the eight manufacturing sectors. We tried several ways to reshuffle data of our terrorism variables to construct a "false" set-up. To save space, we only show results for regressions where we divided all country-pairs into three equal parts and reshuffled only terrorism data for each one-third of country-pairs randomly. In Table 6, only one of 18 coefficients of both types of terrorism is statistical significant and that one coefficient has the wrong sign. Likewise, in Table 7, only five of 48 coefficients of both types of terrorism are statistically significant with two displaying positive signs. These placebos add further support to the largely significant and negative effects of terrorism on manufactured trade in our "true" country-pair FE set-up in Tables 1-4.

[Table 6 and 7 near here]

6. Concluding remarks

By way of summary, we draw some basic messages from the myriad findings from the 7 tables. First, consistent with the formal model, transnational terrorism incidents generally have a substantially larger marginal detrimental influence on trade than does domestic terrorism, thereby suggesting that the former has greater consequences on transportation cost, fixed cost, and/or the cost of conducting business. This difference may also arise from transnational terrorism having a greater marginal impact on income losses (see, e.g., Gaibulloev and Sandler 2008), which, in turn, reduces the demand for imports. Second, any significantly detrimental effect of terrorism on total trade comes about through its impact on reducing trade of

manufactured goods, and not on reducing trade of primary products. Third, there is some tendency for domestic and transnational terrorism to have a larger negative impact on trade involving medium-skilled and high-skilled industries than trade involving labor-intensive or low-skilled industries, but this tendency is sometimes mixed. This is consistent with our inference that skill-intensive sectors, usually located in urban centers, will attract attacks from today's terrorists and that such sectors are less able than less skill-intensive sectors to recover from terrorist attacks. Fourth, imports display a larger adverse consequence from terrorism than is the case for exports. Fifth, gravity model controls are significant and robust with signs in the anticipated direction (Blomberg and Hess 2006; Glick and Rose 2015; Nitsch and Schumacher 2004). Sixth, our falsification tests support our presumed direction of causality.

Compared to the extant literature, our exercise presents the detrimental influence of terrorism by the type of attacks. Even more importantly, we display the negative consequences of terrorism on trade by using a finer decomposition of trade by primary commodities, manufactured goods, and manufactured goods produced with varying factor intensities. In many instances, these distinctions provide much more nuanced and informative results that are consistent with our formal model.

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Table 1: Domestic terrorism and trade
Whole sample

	Pooled Cross-Section Model			Country-Pair Fixed Effects Model		
DV: log (real total trade of) →	All products	Primary commodities	Manufactured goods	All products	Primary commodities	Manufactured goods
	(1)	(2)	(3)	(4)	(5)	(6)
(log product) 1+ domestic	-0.118***	-0.101***	-0.117***	-0.015***	0.007	-0.029***
terrorist incidents, t-1	(0.010)	(0.011)	(0.010)	(0.005)	(0.006)	(0.005)
(log product) real GDP	1.169***	1.053***	1.189***	0.457***	0.407***	0.385***
	(0.009)	(0.010)	(0.009)	(0.083)	(0.105)	(0.081)
(log product) real GDP	0.147***	0.038**	0.212***	0.257***	0.313***	0.302***
per capita	(0.013)	(0.016)	(0.013)	(0.080)	(0.103)	(0.078)
Common border	0.753***	1.246***	0.667***			
	(0.142)	(0.138)	(0.140)			
Common language	0.747***	0.641***	0.876***			
	(0.053)	(0.059)	(0.053)			
(log) distance	-1.326***	-1.178***	-1.341***			
	(0.027)	(0.031)	(0.028)			
Landlocked	-0.639***	-0.880***	-0.453***			
	(0.034)	(0.041)	(0.034)			
Regional trade agreement	0.969***	0.977***	1.106***	0.074***	0.111***	0.087***
	(0.057)	(0.063)	(0.055)	(0.025)	(0.033)	(0.025)
Currency union	0.517***	0.484***	0.488***	0.008	0.175***	-0.012
	(0.132)	(0.137)	(0.140)	(0.049)	(0.063)	(0.042)
Colonial relationship	1.277***	1.506***	1.307***			
	(0.135)	(0.140)	(0.138)			
Common colonizer	0.769***	0.702***	0.731***			
	(0.082)	(0.097)	(0.081)			
Island	0.294***	0.297***	0.270***			
	(0.043)	(0.052)	(0.044)			
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Pairwise fixed effects	No	No	No	Yes	Yes	Yes
# of country-pairs				10596	10056	10478
# of observations	152453	133053	145505	152453	133053	145505
R-squared	0.717	0.602	0.724	0.589	0.452	0.580

Notes: Robust standard errors clustered by country-pair are presented in brackets. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels. Adjusted R-squared for pooled cross-section model and overall R-squared for country-pair fixed effects model. DV stands for dependent variable.

Table 2: Transnational terrorism and trade
Whole sample

	Pooled Cross-Section Model			Country-Pair Fixed Effects Model		
DV: log (real total trade of) →	All products	Primary commodities	Manufactured goods	All products	Primary commodities	Manufactured goods
	(1)	(2)	(3)	(4)	(5)	(6)
(log product) 1+ transnational	-0.168***	-0.144***	-0.180***	-0.012**	-0.006	-0.026***
terrorist incidents, t-1	(0.013)	(0.016)	(0.013)	(0.006)	(0.007)	(0.006)
(log product) real GDP	1.151***	1.037***	1.173***	0.461***	0.414***	0.392***
	(0.008)	(0.010)	(0.008)	(0.083)	(0.105)	(0.081)
(log product) real GDP	0.162***	0.052***	0.225***	0.253***	0.303***	0.297***
per capita	(0.013)	(0.015)	(0.013)	(0.080)	(0.103)	(0.078)
Common border	0.752***	1.246***	0.665***			
	(0.143)	(0.138)	(0.141)			
Common language	0.738***	0.633***	0.867***			
	-0.053	-0.059	-0.053			
(log) distance	-1.328***	-1.179***	-1.344***			
	(0.027)	(0.031)	(0.028)			
Landlocked	-0.640***	-0.879***	-0.455***			
	(0.034)	(0.041)	(0.034)			
Regional trade agreement	0.975***	0.982***	1.111***	0.077***	0.110***	0.093***
	(0.057)	(0.063)	(0.055)	(0.025)	(0.033)	(0.025)
Currency union	0.531***	0.495***	0.499***	0.006	0.174***	-0.017
	(0.133)	(0.137)	(0.140)	(0.049)	(0.063)	(0.042)
Colonial relationship	1.251***	1.485***	1.281***			
	(0.135)	(0.140)	(0.138)			
Common colonizer	0.760***	0.692***	0.723***			
	(0.082)	(0.097)	(0.081)			
Island	0.274***	0.279***	0.252***			
	(0.043)	(0.052)	(0.044)			
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Pairwise fixed effects	No	No	No	Yes	Yes	Yes
# of country-pairs				10596	10055	10478
# of observations	152352	132971	145415	152352	132971	145415
R-squared	0.717	0.602	0.723	0.590	0.454	0.584

Note: Same as in Table 1.

Table 3: Domestic and transnational terrorism, and exports and imports, separately
Whole sample

	All products (1)	Primary commodities (2)	Manufactured goods (3)	All products (4)	Primary commodities (5)	Manufactured goods (6)
	DV: log (real exports of the above var.)			DV: log (real imports of the above var.)		
(log product) 1+ domestic	0.001	0.015*	-0.013**	-0.019***	-0.001	-0.021***
terrorist incidents, t-1	(0.005)	(0.008)	(0.005)	(0.006)	(0.007)	(0.006)
# of country-pairs	10182	9511	9887	10254	9283	10023
# of observations	138379	117260	128471	135983	109579	126551
(log product) 1+ transnational	-0.009	-0.012	-0.007	-0.011	-0.007	-0.032***
terrorist incidents, t-1	(0.006)	(0.008)	(0.006)	(0.007)	(0.008)	(0.007)
# of country-pairs	10182	9511	9887	10254	9282	10023
# of observations	138293	117189	128405	135905	109524	126479
All other control variables	Yes	Yes	Yes	Yes	Yes	Yes
Yea dummies	Yes	Yes	Yes	Yes	Yes	Yes
Pairwise fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered by country-pair are presented in brackets. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels. All regressions are estimated using country-pair fixed effects model. DV stands for dependent variable.

Table 4: Domestic and transnational terrorism, and trade of manufactured goods by resource intensity.
Whole sample

	Labor intensive & resource-intensive manufactures (1)	Low-skilled & technology-intensive manufactures (2)	Medium-skilled & technology-intensive manufactures (3)	Medium-skilled electronics (excl., parts & components) (4)	Medium-skilled (parts & components electronics) (5)	High-skilled & technology-intensive manufactures (6)	High-skilled electronics (excl., parts & components) (7)	High-skilled (parts & components for electronics) (8)
				Panel A: DV is log (real total of the above variables)				
(log product) 1+ domestic	-0.035***	-0.015**	-0.023***	-0.014	-0.040***	-0.008	-0.01	-0.015*
terrorist incidents, t-1	(0.006)	(0.007)	(0.005)	(0.009)	(0.008)	(0.005)	(0.008)	(0.008)
# of country-pairs	9868	9460	10008	7127	7653	10046	8286	8506
# of observations	125239	112351	127071	69445	80315	129012	84836	91444
(log product) 1+ transnational	-0.029***	-0.039***	-0.023***	-0.034***	-0.017*	-0.013*	-0.021**	-0.045***
terrorist incidents, t-1	(0.007)	(0.008)	(0.007)	(0.010)	(0.010)	(0.007)	(0.009)	(0.010)
# of country-pairs	9868	9459	10008	7126	7653	10046	8285	8505
# of observations	125174	112298	127003	69428	80284	128945	84801	91410
				Panel B: DV is log (exports of the above variables)				
(log product) 1+ domestic	-0.028***	-0.015*	-0.027***	-0.011	-0.046***	-0.001	-0.01	0.007
terrorist incidents, t-1	(0.006)	(0.008)	(0.006)	(0.010)	(0.009)	(0.006)	(0.009)	(0.009)
# of country-pairs	9057	8493	9152	5847	6455	9245	7044	7309
# of observations	105925	93495	108105	55286	64573	111423	69094	75527
(log product) 1+ transnational	-0.021***	-0.023***	-0.012	-0.028***	-0.011	-0.005	-0.031***	-0.039***
terrorist incidents, t-1	(0.008)	(0.009)	(0.007)	(0.011)	(0.010)	(0.007)	(0.010)	(0.010)
# of country-pairs	9056	8493	9152	5846	6455	9245	7043	7303
# of observations	105875	93460	108057	55272	64549	111372	69067	75500
				Panel C: DV is log (imports of the above variables)				
(log product) 1+ domestic	-0.017**	-0.013	-0.019***	-0.02	-0.016	-0.009	-0.003	-0.028***
terrorist incidents, t-1	(0.007)	(0.008)	(0.007)	(0.013)	(0.011)	(0.007)	(0.010)	(0.010)
# of country-pairs	9136	8943	9288	5099	6337	9374	7004	7404
# of observations	102047	85933	101278	39215	54083	106239	57536	67411
(log product) 1+ transnational	-0.041***	-0.046***	-0.032***	-0.041***	-0.017	-0.025***	-0.009	-0.035***
terrorist incidents, t-1	(0.008)	(0.010)	(0.009)	(0.015)	(0.012)	(0.009)	(0.013)	(0.012)
# of country-pairs	9136	8492	9287	5099	6337	9347	7004	7404
# of observations	102000	85897	101227	39208	54070	106188	57516	67388
All other control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pairwise fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Same as in Table 3.

Table 5: Dollar value loss (in real term) due to terrorism

	Trade average (in mil $) (1)	loss due to one % increase in Dom. Terror (in mil $) (2)	loss due to one % increase in Trans. Terror (in mil $) (3)	loss due to one incident of Dom. Terror (in mil $) (4)	loss due to one incident of Trans. Terror (in mil $) (5)
Panel A: Average Sample Country					
Total trade of manufactured goods	48752.6	14.14	12.68	187.01	1030.54
Exports of manufactured goods	22658.7	2.95	1.59[a]	38.96	128.95
Imports of manufactured goods	26093.8	5.48	8.35	72.48	678.87
Panel B: Pakistan					
Total trade of manufactured goods	13162.4	3.82	3.42	2.02	26.95
Exports of manufactured goods	6878.8	0.89	0.48[a]	0.48	3.79
Imports of manufactured goods	6283.6	1.32	2.01	0.70	15.83
Panel C: India					
Total trade of manufactured goods	62628.8	18.16	16.28	11.97	243.03
Exports of manufactured goods	34238.0	4.45	2.40[a]	2.93	35.77
Imports of manufactured goods.	28390.9	5.96	9.09	3.93	135.60
Panel D: Nigeria					
Total trade of manufactured goods	7501.51	2.18	1.95	5.39	34.83
Exports of manufactured goods	368.27	0.05	0.03[a]	0.12	0.46
Imports of manufactured goods	7133.23	1.50	2.28	3.71	40.76
Panel E: Spain					
Total trade of manufactured goods	190561.8	55.26	49.55	226.12	3077.40
Exports of manufactured goods	82589.2	10.74	5.78[a]	43.93	359.08
Imports of manufactured goods	107972.6	22.67	34.55	92.78	2146.04

Notes: On average yearly basis over the sample period of 1995-2012, the numbers of domestic (transnational) incidents for the average sample country, Pakistan, India, Nigeria and Spain have been 7.6 (1.2), 188.6 (12.7), 151.7 (6.7), 40.4 (5.6), and 24.4 (1.6), respectively.

[a] The coefficient on transnational terrorism for manufactured exports in Table 2 is not statistically significant.

Table 6: Placebo test, randomly reshuffling data for domestic and transnational terrorism
Whole Sample

	All products (1)	Primary commodities (2)	Manufactured goods (3)	All products (4)	Primary commodities (5)	Manufactured goods (6)
			Panel A: DV is log (real total trade of the above variables)			
(log product) 1+ domestic	-0.003	-0.008	0.000			
terrorist incidents, t-1	(0.004)	(0.005)	(0.004)			
(log product) 1+ transnational				-0.002	0.001	-0.002
terrorist incidents, t-1				(0.006)	(0.007)	(0.006)
# of country-pairs	10636	10067	10498	10636	10065	10496
# of observations	150501	130844	143420	150390	130762	143311
			Panel B: DV is log (real exports of the above variables)			
(log product) 1+ domestic	0.006	0.006	0.003			
terrorist incidents, t-1	(0.005)	(0.006)	(0.005)			
(log product) 1+ transnational				0.006	0.012	0.008
terrorist incidents, t-1				(0.006)	(0.008)	(0.006)
# of country-pairs	10200	9501	9895	10200	9500	9894
# of observations	136135	114940	126099	136032	114870	126001
			Panel C: DV is log (real imports of the above variables)			
(log product) 1+ domestic	-0.003	-0.012	0.013**			
terrorist incidents, t-1	(0.005)	(0.008)	(0.005)			
(log product) 1+ transnational				0.004	-0.003	0.003
terrorist incidents, t-1				(0.007)	(0.009)	(0.007)
# of country-pairs	10280	9260	10039	10279	9259	10038
# of observations	133908	107528	124257	133817	107467	124170
All control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Pairwise fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Only data for terrorism variables is randomly reshuffled. The results of all other variables are statistically and economically significant as in Tables 1 and 2. All other notes are same as in Table 1.

Table 7: Placebo test, randomly reshuffling data for domestic and transnational terrorism
Whole sample

	Labor intensive & resource-intensive manufactures (1)	Low-skilled & technology-intensive manufactures (2)	Medium-skilled & technology-intensive manufactures (3)	Medium-skilled electronics (excl., parts & components) (4)	Medium-skilled (parts & components Electronics) (5)	High-skilled & technology-intensive manufactures (6)	High-skilled electronics (excl., parts & components) (7)	High-skilled (parts & components electronics) (8)
				Panel A: DV is log (real total of the above variables)				
(log product) 1+ domestic	-0.002	-0.010	0.000	0.000	-0.004	-0.002	0.000	0.011
terrorist incidents, t-1	(0.005)	(0.006)	(0.005)	(0.008)	(0.007)	(0.005)	(0.007)	(0.007)
# of country-pairs	9879	9420	10010	7051	7562	10048	8230	8450
# of observations	122957	109946	124625	67504	77624	126614	82483	88785
(log product)1+ transnational	-0.004	-0.020**	-0.003	-0.001	-0.015*	-0.004	0.005	0.006
terrorist incidents, t-1	(0.007)	(0.009)	(0.007)	(0.011)	(0.009)	(0.007)	(0.009)	(0.010)
# of country-pairs	9879	9418	10009	7049	7556	10045	8227	8448
# of observations	122861	109873	124532	67465	77570	126529	82432	88730
				Panel B: DV is log (real exports of the above variables)				
(log product) 1+ domestic	-0.006	-0.002	0.004	0.009	-0.003	-0.006	-0.002	0.008
terrorist incidents, t-1	(0.005)	(0.006)	(0.005)	(0.008)	(0.007)	(0.005)	(0.007)	(0.008)
# of country-pairs	9017	8421	9119	5754	6369	9218	6976	7243
# of observations	103648	91193	105642	53649	62385	108981	67052	73317
(log product) 1+ transnational	-0.006	0.008	-0.004	0.006	-0.011	-0.005	0.012	0.019*
terrorist incidents, t-1	(0.008)	(0.009)	(0.007)	(0.011)	(0.010)	(0.007)	(0.010)	(0.011)
# of country-pairs	9017	8420	9118	5752	6365	9217	6975	7243
# of observations	103560	91140	105568	53631	62355	108913	67029	73286
				Panel C: DV is log (real imports of the above variables)				
(log product) 1+ domestic	0.013**	-0.007	0.001	-0.01	0.002	0.005	0.001	0.002
terrorist incidents, t-1	(0.006)	(0.008)	(0.006)	(0.012)	(0.009)	(0.006)	(0.009)	(0.009)
# of country-pairs	9137	8449	9258	5034	6230	9357	6911	7305
# of observations	99773	83602	98683	37755	51724	103727	55246	64704
(log product) 1+ transnational	0.004	-0.019*	-0.006	0.008	-0.004	-0.005	-0.007	0.003
terrorist incidents, t-1	(0.009)	(0.011)	(0.008)	(0.016)	(0.012)	(0.009)	(0.012)	(0.012)
# of country-pairs	9136	8446	9257	5033	6226	9355	6908	7302
# of observations	99705	83542	98612	37723	51681	103654	55203	64655
All other control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pairwise fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Same as in Table 6.