Are Lives a Substitute for Livelihoods? Terrorism, Security, and U.S. Bilateral Imports

Abstract

In this paper we assess the impact of counter-terrorism measures on trade. Our work brings three value added to the literature: 1/ it develops a simple theory to emphasize the endogeneity between terrorism acts, counter-terrorism measures and trade; 2/ it delivers an original strategy to identify empirically the effect of counter-terrorism security measures on trade flows (using third country incidents); 3/ it uses a new dataset on business visas issued by the US to test further the hypothesis that terrorism is affecting trade through the security channel. Our results suggest that counter-terrorism security measures matter for US imports. The level of the impact is up to three times higher when the acts result in a relatively high number of victims, when the products are sensitive to shipping time or when they ask for networks and business people mobility in order to be sold.

Keywords: Terrorism, trade, security

JEL codes: F12, F13

1 Introduction

Counter-terrorism policies come at a cost. Not only can they be costly because they employ resources that could have been better employed elsewhere in an economy asking for protection, but also because they create transactions costs. Where terrorism happen to be transnational, transaction costs due to higher security at the borders could impact international trade. This ends up creating a trade off between life protection and the economic gains from trade. In his remarks at the Heritage Foundation in 2003, Robert C. Bonner, former Commissioner of the Bureau of Customs and Border Protection at the Department of Homeland Security in the US, recognizes this fact by stating:

> "We must protect American lives, but we must also protect American livelihoods–our economy. That's why we have twin goals: (1) increasing security and (2) facilitating legitimate trade and travel."

After the events of September 11, the US decided to strengthen the security at its borders against transnational terrorism. In 2004, it signed with the EU a customs cooperation agreement to extend the Container Security Initiative throughout the EU. In this agreement, US customs officers could operate in some ports of the European Union to screen and control all cargos to the US that depart from or transit through the European countries (Archick (2005)). To date, several countries have already implemented these measures and other important ports are expected to comply, in particular after London attacks on July 7, 2005. The US and EU also have reached other agreements in air transport by which they have decided to increase identity controls over the borders, via biometric identifiers on their passports. More recently, and in order to defeat terrorism worldwide, the new US administration have decided to extend their cooperation policies by providing over 5 billion USD in assistance to partners in order to improve their own security.

In this paper we ask whether security measures against terrorism are affecting international trade flows, and by how much. Further, we investigate which kinds of goods, sectors and partners are being mostly affected by these measures. First, we set up a simple theoretical framework linking trade to security and the probability of terrorism acts. This theory recognizes explicitly the strategic nature of the interactions between terrorist organizations and the authorities at the borders. These interactions are shown to be directly related to a country's degree of openness. Second, based on our theory predictions, we investigate empirically how and by how much counter-terrorism security measures at the borders are affecting trade.

Our paper contributes to the literature on trade and conflicts. This literature investigates the relationship between trade openness and interstate or civil wars (for recent contributions, see for instance Martin, Mayer and Thoenig (2008b) and (2008a)) or the cost of various forms of violence (terrorism, external conflicts, revolutions, inter-ethnic fighting) on trade flows (see for instance Blomberg and Hess (2006)).

In this literature, the relation between globalization and terrorism is growing. Frey, Luechinger and Stutzer (2007) and Mirza and Verdier (2008) survey many studies that look at the different channels that link globalization to terrorism. From these surveys, two important features tend to emerge. The first one is the fact that trade and terror are endogenous to each other in many ways. On the one hand, there is the usual effect that terrorism and insecurity increase transaction costs or reduce incomes, and therefore is expected to affect negatively trade capacities and exchange opportunities. On the other hand however, international integration can also affect terrorist organizations either by changing their resources, their opportunity costs or by impacting upon the expected rents from terrorism[1]. Second, there is little work in the literature that takes explicitly into account the treatment of the role played by counter-terrorism measures. The purpose of this paper is to fill that gap and to contribute theoretically and empirically on these two dimensions (endogeneity and security measures), linking actually one to the other.

More specifically, we first propose a simple theory linking endogenously trade flows, security measures and terrorism incidents. It emphasizes two channels associating trade to security. The first one expresses the "traditional view" that an increase in security measures (to prevent terror) could affect transaction costs and thus trade. The second channel works the other way round: openness to trade makes a country dependent on the foreign products it imports, which in turn induce the authorities not to increase much security at the borders. This tends to increase consequently the probability of terrorism activities. These mechanisms suggest therefore that the negative impact of terror on bilateral trade is underestimated if endogeneity is not accounted for.

Our theory goes then a step further by suggesting a way to remove out this endogeneity in order to identify empirically the counter-terrorism effect on trade. Apart from being affected by openness, security measures are also shown to be related to the degree of efficiency of the authorities and the marginal costs of the terrorists groups perceived by these authorities (ie. perceived efficiency of terrorists). These two driving forces of security are exogenous to trade. In particular, any shock that enables to change the perception of the authorities about the ability of terrorist groups to attack, should shift the security curve and consequently, should hit trade through an exogenous increase in security costs.

Finally, in the empirical part of the paper, we try to detect good proxies of these security shifters. To do so, and as in Krueger and Laitin (2006), we distinguish between three types of countries: the countries of the first nationality of the perpetrators (origin countries), the countries of first nationality of victims (targets) and the countries of location of incidents (might be the origin, the target or any other third country). We focus on one target country, the US. We argue that past incidents located in third countries, constitute good shifters of US security and help identifying the impact of counter-terrorism we are searching for. To fix ideas, take the example of Al-Qaeda in 1998, whose origin country, defined here as the country of the first nationality of its leaders, is considered to be Saudi Arabia. In that year, Al-Qaeda managed to explode a car bomb against the U.S. embassy in Dar Es-Salam (Tanzania), which hurt nearly 80 people. We make the point here that, with such types

[1] see Li and Schaub (2004) or Blomberg and Hess (2008) who provide estimates for the impact of openness on terrorism.

of incidents, located in third countries (here, Tanzania), we are capable to identify the exogenous impact of terrorism on US imports from Saudi Arabia. We show indeed that the use of such incidents increases drastically the (negative) value of the parameter associated with the terror variable.

Few studies look specifically at the relation between insecurity and trade, but without emphasizing terrorism activities per se. For instance, Anderson and Marcouiller [(1997), (2002)] consider the case where insecurity is born from smuggling or expropriation activities. Closest to our work is Anderson (2008) who explicitly investigates the theoretical endogeneity between terrorism activities and openness. Specifically, Anderson studies how an increase in the size of the market (due to openness) influences terrorism activities notably through allocation of labor resources in general equilibrium. Bigger markets might be safer or less safe depending upon a range of parameters values leading respectively to higher or lower wages in the economy. In his model, the government respond endogenously by setting either trade or enforcement policies that could amplify or offset/ these tendencies. Our paper illustrates an alternative mechanism. The targeted government plays an asymmetric information strategic game with terrorists activities, choosing counter-terrorist measures that trade off the benefits of such measures on people protection against the increased transaction costs on international trade flows. From such an analysis, we also identify proxies that allow us to empirically assess the two-way causality between trade and terrorism.

The choice of working on the US came naturally to us for two main reasons: incidents against Americans and their assets all over the world during the last 40 years, have been high and persistent (i.e. one-third to one-half of the yearly incidents have U.S related targets). This persistence of attacks has forced the US to devote permanent and significant resources for security at their borders. Besides, over the period, Americans have been hit by perpetrators originating from over one-hundred different countries with correspondingly high differences in the degree of threat across countries and time. We also think that the allocation of security resources devoted to protect the US nation have been adjusted correspondingly. This high variation in the terrorism data against one well defined target country, should help us estimate more accurately the impact of terror on trade.

We combine three datasets on trade, terrorism incidents and number of business visas issued by the U.S. First, for the trade data, we use bilateral imports of the United States from 1968 to 2003 at the product level (SITC4/5 digits) from the NBER World Trade Data complied by Feenstra and Lipsey (2005), completed where necessary by data provided from FLUBIL (OECD and INSEE combined data). Disaggregated data are needed here in particular, in order to be able to capture the expected differentiated impact of counter-terrorism measures on trade across products, as it will be made clearer in the heart of the text.

Second, we use the ITERATE dataset from 1968 to 2003 set-up by Mickolus, Sandler, Murdock and Flemming (2004) which reports transnational terrorist activities. More precisely, ITERATE is an event-based dataset that provides information on the date, country of location of the attack, the 1st nationality of the perpetrators (origin country) and the 1st nationality of the victims (targeted country). It lists all of the incidents in the world that have been reported in the medias since 1968 onwards.

Third, to test for further robustness of our theory and results, we link these data with business visa allowance data provided by the US Department of State on their website. The Department reports the number of business visas issued by the United States to each partner country from 1997 to 2002. We expect, in particular, that trade in goods which are sensitive to the movement of businessmen to be directly affected by terrorism acts through lower visa allowances. On the opposite, trade not sensitive to businessmen movements should not be affected by terrorism incidents, at least through the visa allowance effect.

Our results show first, that a 1% increase in the frequency of past incidents reduces US bilateral imports from the origin country of terrorism by around 0.01%. This negative effect is nonlinear, however. The elasticity is higher the riskier is the country of origin in terms of its related frequency of incidents. In particular, a 1% increase in the frequency of past incidents from countries such as Pakistan and/or Saudi Arabia in recent years results in around 0.5 to 1% decrease in their exports to the US. Second, we find that the level of the impact more than doubles when the acts result in a relatively high number of victims and for products that are sensitive to the time-length of shipping and business network-lengths. Third, we further show how terrorism incidents affect the number of business visas delivered by the US, thereby impacting bilateral US imports, specifically in differentiated products. But as argued in the text this channel appears to be weak in magnitude as it is estimated to represent 1/6 of the total effect of terrorism incidents on trade in differentiated products.

Our paper is structured in the following way. In section 2, we present the ITERATE dataset and describe some stylized features that will be of interest to investigate the links between transnational terrorism and bilateral trade flows. Section 3 sets then a simple theoretical model of endogenous transnational terrorism and security, embedded into a standard trade model. Section 4 explains the induced empirical strategy to test the impact of terrorism and counter-terrorism measures. Section 5 takes the model to the test and presents the econometric results. Section 6 provides further evidence on the impact of terrorism translating through higher security at US borders. In particular, it investigates one specific (observable) channel of security measures at the border: the allocation of business Visas by US authorities. Finally, section 7 concludes.

2 Transnational Terrorism and the ITERATE Database

We use the ITERATE data from 1968 to 2003 set by Mickolus, Sandler, Murdock and Fleming (2004). More on the definition of transnational terrorism can be found in Mickolus *et al.* Besides, a discussion over the definition given by these authors can be found in the first working paper version of this article[2].

[2]See Verdier and Mirza (2006).

ITERATE identifies among other variables the date, location and number of victims (wounded and casualties). Besides, ITERATE also reports the first country of victims and the perpetrators' first country of origin when it is known. In the heart of the paper, we shall make use of these variables to look at the impact of terrorism acts emanating from an origin country on its trade relationship with a victim (or potential victim) country, the US.

We begin by looking at the **countries of origin**. Table 1 ranks the first 60 countries of origin of the perpetrators across periods, by their number of incidents over the period, although one should be aware that most if not all of the countries around the world have been at the origin of at least one terrorist incident from 1968 onwards. On the same period, further calculations show that around half of the world (ie. around 100 countries) was directly concerned as being at the origin of incidents targeting the US. Besides, it is worth mentioning that one third of total incidents have been perpetrated by unknown groups, to which no origin have been associated.[3]

We turn next to the **target countries**. The country is coded as target when it is that of the main nationality of the victims. For nearly 80% of the data, the victims relates to one nationality only, which is why one could assign in a relatively confident way only one target country to an incident. It is important to note here that victims, in ITERATE, are defined as "those who are directly affected by the terrorist incident by the loss of property, lives, or liberty"[4]. By setting a simple ranking across targets we find that the US is by far the country that is most hit by transnational terrorism attacks over the period, before France, Israel and Great Britain. Besides, the distribution of incidents across targets does not change over time. A simple calculation of the coefficient of correlation between the distribution at the beginning (1968-1978) and that at the end of the period (1997-2003) is around 0.96.

It is quite simple to guess, however, that some countries are systematically targeted by a small number of groups related to one particular country of origin like in the Israel-Palestinian case.[5]. Is there a general bilateral pattern of incidents that we can find in the data? Table 3 tries to respond to this question. It shows the top 65 in the ranking of **'bilateral' incidents** (i.e. ranking by origin-target countries) wherever those incidents take place.

- First, one can easily see that over one third of the bilateral incidents involve the US as a target country: that is, not only the frequency of incidents is significantly high against the US, its distribution is spread over a big sample of origin countries. This is obviously not the case for Israel, France or Great Britain which are associated with at most 3 origin countries in the top

[3]As it has been already documented in Sandler and Enders (2004), the number of incidents has decreased dramatically after the nineties compared to the first decade. Although experienced by most of the origin countries, this drop had not been uniform. For instance, although groups from Palestine and Colombia had been very active during the whole period, Lebanese and Iranien group activities had been very significant only during the eighties and the nineties. In recent years, these activities have even risen dramatically in some countries like Pakistan, Afghanistan and Saudi Arabia.

[4]Thus, when a French embassy is hit without casualties in say, an African country, France is then coded as the target country

[5]Terrorism incidents in Isral/Palestine are usually considered to be *domestic*. Theoretically, they should not be reported by ITERATE. However, ITERATE reports a part of the incidents implying *third* countries: indeed, the transnational character show up when Palestinian groups perpetrate incidents in *third* countries or when victims relates to *third* countries.

65. This high variance of incidents against the US, makes this country an ideal candidate to study econometrically the impact of terrorism incidents on trade using panel data.

- Second, over the period but in particular before the 1990s, terrorist groups tend to hit targets that are relatively close to home and/or had big influence on internal policies of origin countries: that is in particular the case of some Latin American countries (Colombia, Puerto Rico, Peru, Cuba, Argentina) vis-à-vis the US but also that of Algeria and Spain vis-à-vis France. As proximity and colony (or neo-colony) ties are also known to be factors of trade this could give a rapid idea on why one could find some positive relationship between terrorism activities and bilateral trade if those factors are not correctly accounted for. In recent years however, the groups that were the most active and that have concentrated their attacks on the US in particular, emanated from Pakistan (100 times more between beginning and end of period), Saudi Arabia (50 times more) and Colombia (30 times more). These extremely high figures have to be attenuated though for Saudi Arabia and Pakistan by the fact that the activities of their groups were quasi-null in the beginning of the period (only one attack each in the 1968-1978 period). Thus, only terrorism groups from Colombia seem to have maintained a high intensity of their activities against the US in Latin America.

- Third, it is also interesting to see that most of the economies at the origin of the bilateral incidents are developing countries that are mainly specialized in agriculture, natural resources and manufacturing employing intensively those resources. Whereas countries like Saudi Arabia, Iran or even Colombia are specialized in oil production and oil related products like plastic (especially Saudi Arabia), Latin American countries in general (including Colombia) exploit intensively some natural resources from agriculture and fishing (Argentina, Cuba, Colombia, Chile, Puerto Rico) to mineral resources (Peru) and mining (Chile). As differences in specialization between developing and developed countries represent another important factor of trade, this is then another reason why one could retrieve a positive relationship between terrorism and bilateral trade if the degree of specialization of countries is not accounted for.

Finally, we turn to the **countries of location** of the incidents. It is worth mentioning that an incident has three possible locations. It can be set in the country of origin, the target country but it can also be perpetrated in a *third* country. The third country represents the country where the action begins *albeit* different from the origin and target states. Figure 1 sketches the distribution of the incidents extracted from the ITERATE database across these 3 possible locations. We can see that only a small and relatively stable proportion over time (10 to 20%) takes place in the targeted countries. Attacks like those of New York (2001), Madrid (2003) and more recently London (2005) are not representative of most of the incidents. In the earlier period, around 30 to 50% of the incidents took place in *third* countries but that share declined steadily over the period to reach around 20% of the incidents. This reduction seems to be concomitant with the rise in the share of incidents taking place in origin countries (i.e. where they have been planned and prepared). Hence, at the end of the period, 60 to 80% of the incidents became local. These figures are quite similar to those of Krueger and Laitin (2003) who use the Department of State dataset to assert that, in recent years, perpetrators preferred setting-up actions against "targets from foreign countries [that are] close to home". The reasons are beyond the scope of this paper. Notice however, that even if the third country location is decreasing, it remains highly variable throughout the period. In what follows we take advantage of this high variability in the third country incidents to identify our theoretical relationship linking terrorism to trade through higher security at the borders.

3 A Simple Model of Trade, Terrorism and Security

In this section we describe the basic elements of a simple model of trade, terrorism and security. There is one country (the US) labelled 0 and N other countries with whom country 0 is trading.

3.1 Trade

Each country produces differentiated goods under increasing returns. The utility of a representative agent in country 0 has a standard Dixit Stiglitz form:

$$U_0 = \left[\sum_{j=0}^{j=N} n_j x_{0j}^{(1-1/\sigma)} \right]^{1/(1-1/\sigma)}$$

where n_j is the number of varieties produced in country j, x_{0j} is country 0 demand for a variety of country j (all goods produced in j are demanded in the same quantity by symmetry) and $\sigma > 1$ is the elasticity of substitution. In country 0, this helps define an usual consumer price index:

$$P_0 = \left(\sum_{j=0}^{j=N} n_j p_j^{1-\sigma} T_{0j}^{1-\sigma} \right)^{1/(1-\sigma)}$$

where p_j is the mill price of products made in j and T_{0j} are the usual iceberg trade costs between country 0 and country j. If one unit of good is exported from country j to country 0 only $1/T_{0j}$ units are consumed. Trade costs depend on geographical distance, trade restrictions and will also be assumed to depend on security measures (more on this below). As is well known the value of demand by country 0 from country j is given by

$$m_{0j} = n_j E_0 \left[\frac{p_j T_{0j}}{P_0} \right]^{1-\sigma} \quad (1)$$

where E_0 is total expenditure of country 0.

In each country, the different varieties are produced under monopolistic competition and the entry cost to produce in a monopolistic sector is supposed to be 1 unit of a freely tradable good which is chosen as world numeraire. This good is produced in perfect competition. This in turn fixes the wage rate in country 0 to its labor productivity a which is assumed to be the same across countries and across sectors under perfect and imperfect competition (for simplicity). Given this, standard mark

-up conditions from profit maximization by firms give that mill prices in the monopolistic competitive sector are identical and equal to the mark up $\sigma/(\sigma-1)$ times marginal costs (also equal to 1). As labor is the only factor of production, and agents are each endowed with one unit of labor, total expenditure in country 0 is given by $E_0 = aL_0$ where L_0 is the number of workers in country 0. On the supply side, free entry implies that $n_j = aL_j/(\sigma)$. In equilibrium, the indirect utility of the representative consumer in country 0 is

$$U_0 = U_0(\mathbf{T}_0) = \frac{a}{\frac{\sigma}{\sigma-1}(\sigma)^{\frac{1}{\sigma-1}}} \left(\sum_{j=0}^{j=N} (aL_j) T_{0j}^{1-\sigma} \right)^{1/(\sigma-1)}$$

with $\mathbf{T}_0$ the vector $\{T_{0j}\}_{j=0,\ldots N}$ of iceberg costs between country 0 and the rest of the world.

As is well known from this simple model, one gets bilateral imports of country 0 from country j as proportional to :

$$m_{0j} = a.L_j E_0 T_{0j}^{1-\sigma} P_0^{\sigma-1} \tag{2}$$

3.2 Terrorism and Security

We assume that there are $K \leq N$ terrorist organizations, each of them being associated to one particular country or having headquarters located in one country. The objective of each of these organizations is to get visibility (which help them capture or enjoy particular political or economic rents). In order to do this, each organization is going to spend resources to commit a terrorist event on country 0. More precisely, we assume that a typical terrorist organization from country j maximizes

$$Max_{R_j} \; \Pi\left(R_j, S_j\right) V_j - \theta R_j \tag{3}$$

where $\Pi\left(R_j, S_j\right)$ is the probability of success of a terrorist act in country 0. It depends positively on the amount of resources R_j invested by the terrorist organization and negatively on the security measures S_j implemented by the government of country 0 against country j θ is marginal resource cost of the terrorist organization and V_j is the perceived visibility gain enjoyed by the terrorist organization when terrorism is successful. We assume a specific parametric form for the probability of success $\Pi\left(R_j, S_j\right)$. More precisely, as in Anderson and Marcouiller (1999) we take a simple asymmetric contest success function:

$$\Pi\left(R_j, S_j\right) = \frac{R_j}{R_j + \varphi S_j}$$

with the technological parameter $\varphi > 0$ reflecting the relative efficiency of security measures to reduce the occurrence of terrorism.

The solution of (3) gives immediately: the reaction curve of terrorist group j

$$R_j \quad = \quad R(S_j, \theta) = \sqrt{\frac{\varphi S_j V_j}{\theta}} - \varphi S_j \qquad \text{for } S_j \leq \frac{V_j}{\varphi\theta}$$

$$= \quad 0 \qquad\qquad \text{otherwise}$$

The government of country 0 is concerned both by the economic welfare of the representative consumer $U_0(\mathbf{T}_0)$ and about the level of security Φ_0 of his citizens against terrorism. To fix ideas, consider that he maximizes

$$W_0 = LogU_0(\mathbf{T}_0) + \mu Log\Phi_0$$

where the level of security Φ_0 is a positive function of the probability of non occurence of terrorist acts in country 0:

$$\Phi_0 = \Phi_0(\mathbf{R}, \mathbf{S}) = \prod_{j=1}^{j=K} [1 - \Pi(R_j, S_j)]$$

with $\mathbf{R} = \{R_j\}_{j=1,..K}$ and $\mathbf{S} = \{S_j\}_{j=1,..K}$ are respectively the vector of resources spent by terrorists organizations and security measures taken by the government of country 0. Security measures S_j against terrorists residing in country j are likely to increase transactions costs on trade flows (security checks, time delays, restrictions on passports of business people, various immigration controls) and we simply pose that

$$T_{0j} = T_j(S_j) \text{ with } T_j'(.) > 0$$

We assume that the government of country 0 forms some beliefs on the level of resources undertaken by terrorists from country j to commit a terrorist act in country 0 and given these beliefs (more on this in the appendix), his problem is simply

$$Max_{\{S_j\}} \ LogU_0(\mathbf{T}_0) + \mu \ E_{\mathbf{R}} \ Log\Phi_0(\mathbf{R}, \mathbf{S})$$

where $E_{\mathbf{R}}(.)$ reflects the expectation operator of government of country 0 on the vector of terrorist resources $\mathbf{R}$. Neglecting constant terms, this problem can be rewritten as:

$$Max_{\{S_j\}} \ \frac{1}{\sigma - 1} Log \left(\sum_{j=0}^{j=N} L_j T_{0j}^{1-\sigma} \right) + \mu \ E_{\mathbf{R}} \ \sum_{j=1}^{j=K} Log[1 - \Pi(R_j, S_j)]$$

or

$$Max_{\{S_j\}} \ \frac{1}{\sigma - 1} Log \left(\sum_{j=0}^{j=N} L_j [T_{0j}(S_j)]^{1-\sigma} \right) + \mu \ E_{\mathbf{R}} \ \sum_{j=1}^{j=K} Log \frac{\varphi S_j}{R_j + \varphi S_j}$$

with the obvious notation that for a country j which has no terrorist organization residing there $S_j = 0$ and $T_{0j} = T_{0j}(0)$

It is easy to see that the first order conditions of this problem can be written as:

$$m_{0j} \frac{\partial T_{0j}}{\partial S_j} \frac{1}{T_{0j}} = \mu \left[\frac{1}{S_j} - \frac{d}{dS_j} [E_{R_j}(Log(R_j + \varphi S_j)) \right] \qquad (4)$$

with

$$m_{0j} = \frac{L_j T_{0j}^{1-\sigma}}{\sum\limits_{h=0}^{h=N} L_h T_{0h}^{1-\sigma}} \tag{5}$$

The left hand side is simply the marginal distortional cost of imposing security controls and measures. It affects trade flows and, for a given country j is proportional to the level of imports m_{0j} of country 0 from country j. The right hand side is the marginal gain of security measures on the probability that there is no occurrence of a successful terrorist act in country 0. It is going to depend on the structure of beliefs that the government of country 0 has on the amount of terrorist resources $\mathbf{R}$ spent by terrorist organizations against country 0.

To fix ideas, we take for each terrorist organization j, that the resource cost θ can take two values θ^L and θ^H with $\theta^L < \theta^H$. Denote then ν_j^L and $\nu_j^H = 1 - \nu_j^L$ respectively the beliefs government of country 0 has on terrorist organization j having a resource cost $\theta_j = \theta^L$ and $\theta_j = \theta^H$. Then (4) can be rewritten as:

$$m_{0j} \frac{\partial T_{0j}}{\partial S_j} \frac{1}{T_{0j}} = \mu \left[\nu_j^L \frac{R_j^L}{S_j \left[R_j^L + \varphi S_j \right]} + (1 - \nu_j^L) \frac{R_j^H}{S_j \left[R_j^H + \varphi S_j \right]} \right] \tag{6}$$

with[6]

$$R_j^L = R(S_j, \theta^L) = \sqrt{\frac{\varphi S_j V_j}{\theta^L}} - \varphi S_j \text{ and } R_j^H = R(S_j, \theta^H) = \sqrt{\frac{\varphi S_j V_j}{\theta^H}} - \varphi S_j \tag{7}$$

The solution of (6), (5) and (7) defines then a Bayesian Nash equilibrium vector in terrorism and security $\{\mathbf{S}^*, \mathbf{R}^{L*}, \mathbf{R}^{H*}\} = \{\mathbf{S}^*(\boldsymbol{\nu}^L), \mathbf{R}^{L*}(\boldsymbol{\nu}^L), \mathbf{R}^{H*}(\boldsymbol{\nu}^L)\}$ which depends on the vector of beliefs $\boldsymbol{\nu}^L = \{\nu_j^L\}_{j=1,..K}$ that government 0 has on terrorist organizations. In theory, once such an equilibrium is computed, one may have the values of trade flows of country 0 with the rest of the world.

To be a bit more precise, let us consider the case where transactions costs between countries 0 and j take an exponential form:

$$T_{0j}(S) = T_j \ e^{\beta S_j} \text{ with } \beta > 0$$

and that there is a unique terrorist group in one country j. Then (6) and (7) are rewritten as:

$$\frac{m_{0j}\beta}{\mu} = \frac{1}{S_j} - \sqrt{\frac{\varphi}{V_j}} E(\sqrt{\theta}) \frac{1}{\sqrt{S_j}} \tag{8}$$

[6] The derivation of (6) comes from

$$m_{0j} \frac{\partial T_{0j}}{\partial S_j} \frac{1}{T_{0j}} = \mu \left[\frac{1}{S_j} - \frac{d}{dS_j} [E_{R_j}(Log(R_j + \varphi S_j)] \right]$$

with

$$E_{R_j}(Log(R_j + \varphi S_j)] = \nu_j^L Log(R_j^L + \varphi S_j) + (1 - \nu_j^L) Log(R_j^H + \varphi S_j)$$

with $E(\sqrt{\theta}) = \nu_j^L \sqrt{\theta^L} + (1-\nu_j^L) \sqrt{\theta^H}$ [7]). In the appendix we solve for the case with K terrorist organizations and give sufficient conditions for the existence of a unique Bayesian Nash Equilibrium of the terrorist-security game.

The case with only one terrorist group located in a particular country j can be easily illustrated graphically with the structure of the equilibrium represented in figure 2. The first quadrant plots the two relationships (8) and (2). Curve (SS) represents equation (8) and is downward sloping. It shows how the level of security measures undertaken by country 0 is reduced when the level of trade flows between country 0 and country j m_{0j} gets larger. Conversely, curve (TT) represents equation (2) and depicts the fact that the actual level of trade flows depends negatively on security measures. These two relationships therefore describe a two-way interaction between trade flows and security measures. Assuming, as shown in the picture that a stable equilibrium exists, it is described by point E at the intersection of (SS) and (TT).

One may as well compute the average probability of non occurrence of a terrorist act:

$$E(\Phi_0) = 1 - \left[\nu_j^L \frac{R(S_j,\theta^L)}{[R(S_j,\theta^L)+\varphi S_j]} + (1-\nu_j^L)\frac{R(S_j,\theta^H)}{[R(S_j,\theta^H)+\varphi S_j]}\right] = \sqrt{\frac{\varphi}{V_j}} E(\sqrt{\theta}) \sqrt{S_j} \qquad (9)$$

The second quadrant plots the curve (PR) describing how the average probability $E(\Phi_0)$ of no terrorism in country 0 varies with the level of security implemented in the country (equation (9)). The equilibrium average probability of no success of terrorism is then provided by point P in figure 2.

Several simple comparative statics can be undertaken in this setting. It is easy to show that a decrease in the expected cost of some terrorist actions $E(\sqrt{\theta})$ or an increase in the efficiency of authorities φ_0 have a positive effect on security measures undertaken at the borders (see figure 3). Interestingly, the (TT) curve remains unaffected which ends-up reducing equilibrium trade flows. Besides, equation (8) shows that in turn, the probability of non occurrence of incidents decreases.

On the opposite, an increase say, in L_j total employment, or a decrease in some trade costs T other than security costs, like transport costs, both tend to increase imports m_{0j}. This however, shifts both (TT) upward and (SS) downward. The effect is a reduction of security measures S_j^* and a reduction of the probability of non occurrence of incidents $E(\Phi_0)$ (i.e. increase in the probability of provoking an incident).

4 Estimation Strategy

What are the empirical implications of such a model? Clearly, equations (8) and (2) suggest an endogeneity between bilateral trade flows, security and bilateral terrorism. Second, in order to capture the relationship going from security to trade only, exogenous factors that affect only the security curve (SS) are needed, holding constant all variables that affect both curves (i.e. distance, common colony, GDPs, etc...). Equation 8 is a second degree polynomial equation. Solving for security (S_j), one can show that it directly depends on the interaction between expected marginal costs of the terrorist

[7] We assume a configuration of parameters such that $S_j < 4V_j/(E(\sqrt{\theta})\varphi$ to ensure that the SOC are satisfied.

organization and the effectiveness of security measures, that is $E(\sqrt{\theta}).\varphi_0$. It is interesting to see then that these variables, and a fortiori their interaction, are affecting the security curve without impacting the trade curve, which makes them very good candidates to identify our effect.

Now, we do not observe the degree of efficiency of security measures, neither do we observe the marginal costs of terrorist actions, perceived by the authorities. What we do observe though are terrorism incidents perpetrated in the past that could reveal the efficiency of both institutions. Let us consider that past incidents are defined over a 5 years period (i.e. the time horizon over which authorities formulate their beliefs and evaluate their efficiency at date t, is assumed to be based on incidents going back up to $t-4$)[8]. Thus, let n_t express the total number of incidents perpetrated in the world over the period $[t, t-4]$, observed at date t. Over this period, let us also define $n_{j,t}^{US}$ to be the number of *bilateral* incidents during the past 5 years (i.e. number of incidents perpetrated by groups from j against the US). Next, for the same period, let $n_{j,t}$ be the total number of incidents that have originated from a country j and n_t^{US} the total number of past incidents that have hit the US in whichever location in the world. We consider alternative indicators based on these incidents in the following regressions.

- The first indicator we consider is a frequency measure based on *bilateral* terrorism in the past. Bilateral terrorism is a one originating from a country j and directed towards an identified US target. When it takes place, this bilateral terrorism could be the outcome of three different factors: a lack of efficiency of the authorities through φ_0, a perception by the latter of a lack of efficiency of the terrorist organization through $E(\theta)$, or an interaction of both factors. Thus, **we propose $F_{j,t}^{US} = \frac{n_{j,t}^{US}}{n_t}$ to be the first proxy to reveal current security**. It says that, everything being equal, an increase in the frequency of bilateral incidents over the last 5 years (an increase in incidents sourced from j against US more than proportional to that of total incidents around the world) should inform about a higher ability of perpetrators from j to attack US targets, a lower efficiency of security measures or a combination of both. This should translate into higher security measures at the US borders. Recall however from section 2 and 3 above, that there might be a serious endogeneity problem between *bilateral* terror and *bilateral* trade. This can be due to security issues, but also to proximity, cultural, geopolitics or (former)-colony issues as well as specialization: all these if not well accounted for could underestimate the *negative* impact of terror.

- Assuming we cannot neatly control for all of these factors, we also propose a second set of security indicators which focus instead on multilateral (not bilateral) measures of terrorism. Recall indeed, from our theory's statement, that what matters for US security policy is the efficiency of authorities for protection, described by φ_0, and their beliefs about the abilities of terrorists to act, through the parameter $E(\theta)_j$. Hence, although their interaction has a bilateral flavor, both factors are not bilateral *a priori*. US authorities may measure the efficiency of

[8] We have also considered past time horizons of 3, 7 and 10 years. The results are qualitatively very similar to a 5 years horizon. They are available upon request

terrorists by their ability of setting acts anywhere in the world, against any target, not just against the US. Hence, **a proxy of $E(\theta)_j$ can be obtained from,** $F_{j,t} = \left[\frac{n_{j,t}}{n_t}\right]$. It says that, everything being equal, the higher the number of incidents sourced from a given country j relative to the total perpetrated in the world, the higher the relative efficiency of organizations from j. An increase in $F_{j,t}$ should then translate into higher security at US borders.

On the other hand, US authorities can be thought to prevent efficiently terror when they are able to avoid acts sourced from any possible country, not just one typical country. Hence φ_0 **can be approached by** $F_t^{US} = \left[\frac{n_t^{US}}{n_t}\right]$, the frequency of total incidents targeting the US (across all countries of origin). An increase in F_t^{US} should then increase security levels as well. **Together, F_t^{US} and $F_{j,t}$ measures can be considered to be two alternative preventing-terror security indicators.** Ultimately however, recalling again the theory, it is the interaction $(E(\sqrt{\theta}).\varphi_0)$ that should matter for security. Hence, **a fourth and more complete indicator of counter-terrorism is :**

$$\pi_{jt}^{US} = F_{jt}.F_t^{US} = \left[\frac{n_{j,t}}{n_t}\right].\left[\frac{n_t^{US}}{n_t}\right]$$

- ITERATE delivers information on the country of location of each incident. This enables us to split terrorism incidents n_{jt}, originating from j, between those perpetrated within the country of origin $(n(OR)_{jt})$, those located in the targeted country $(n(US)_{jt})$ and those located in third countries $(n(TH)_{jt})$ in order to obtain alternative indicators for counter-terrorism measures. The first two locations might not be completely independent from trade activity, which might end up biasing the estimates.[9]

  On the opposite, third country incidents are by definition, perpetrated outside the origin and target countries. Thus, they should be less related to the characteristics of those countries and bilateral trade between them. Some would argue, however, that third country incidents are endogenous to security at US borders because an increase in the latter would force terrorist organizations to perpetrate incidents outside the US. Our third country variable however, is defined over incidents in the past (not current incidents). Besides, this variable *is not* computed bilaterally: it is the share of total incidents that originate from country j, on whichever target (not necessarily targeting the US), and perpetrated within third country lands (i.e. outside j and outside the US). The non-bilateral character of the variable is perfectly in line with our theory as it is supposed to capture the US authorities beliefs on the degree of efficiency of the terrorist organization from country j in general, $E(\sqrt{\theta})_j$, to hit in whichever country and on whichever target. For instance, terrorist actions emanating from say, an Algerian or Lebanese

[9] First, the increasing number of transport means (trucks, airplanes, etc...) heading to the US might enhance the likelihood of a terrorist attack inside US borders. Besides, as our theory suggests, bigger US partners might not be sufficiently controlled at the borders, increasing back the probability of incidents. Second, any risky event in a country of origin that trade with the US (like an escalation to war between a given state and the US) can reduce bilateral trade but might also independently increase terrorism activities inside the former.

identified group on a given target, should help the US authorities to reformulate their beliefs on the efficiency degree of those groups and take security measures to protect their own borders in consequence.

Finally, all this suggests that third country incidents are much better candidates of exogenous security than all other incidents. We thus define a fifth indicator of exogenous security based solely on third incidents. **Let** $F(TH)_{jt} = \left[\frac{n(TH)_{j,t}}{n_t}\right]$ **be the frequency of past incidents perpetrated in third countries, we thus define**

$$\pi(TH)_{jt}^{US} = F(TH)_{jt}.F_t^{US}$$

to be the last security measures indicator we consider.

Because they are the most closely linked to our theory, $\pi(TH)_{jt}^{US}$ together with π_{jt}^{US}, will be our main two variables of interest in the next sections.

5 Data and Econometric Results

The dependent variable we study is bilateral US imports. We have chosen to work with data at the product level in order to control for the relative specialization of countries which we already suspect (see section 2) to be correlated with both measures, bilateral trade and terrorism activities. As well, a product level analysis allows us to investigate the differential effects of transnational terrorism and bilateral security measures across sectors. Something that has been so far overlooked in other analysis of the effects of transnational terrorism on bilateral trade flows.

We extract 1968-2000 bilateral imports of the United States at the product level (SITC4/5 digits) from the NBER World Trade Data complied by Feenstra and Lipsey. The data however, provides only values of flows that exceed 100,000$ per year. This constitutes a potential problem as most origin countries of terrorism are LDCs that export little of many products and too much of a very few set of others where they are really specialized. Thus, neglecting small amounts could result in an over-representation of products of specialization in the dataset, possibly less sensitive to terrorism attacks. This could end up underestimating the impact of terrorism activities on trade. To deal with this problem, we completed the NBER dataset with the FLUBIL trade dataset from the French National Institute (INSEE), reporting flows over 1,000$. FLUBIL is basically an updated version of the OECD dataset on bilateral trade flows where some aggregation check-ups and minor corrections have been undertaken. It also completes the NBER dataset as it runs until 2002.

The sources of the rest of the variables that are used (i.e. traditional gravity and control variables), are listed in the appendix of the paper.

We want to study a bilateral US imports relation based on the trade equation (1) or its developed version equation (2), where security measures directly affect transaction costs. Let transaction costs be expressed as: $T_j = Dist_j.\ e^{\beta S_j}.e^{(\sum_v \eta_v.dv_j)}$. Here, trade costs depend on geographical distance between j exporter and the US border, a set of dummy variables (dv) designating common language and contiguity with the US, and a vector S_j representing a number of alternative security measures against potential terrorism emanating from j. S_j can encompass any of the frequency measures mentioned above ($F_{jt}^{US}, F_{jt}, F_t^{US}, \pi_{jt}^{US}, \pi(TH)_{jt}$), or some combinations of those.

By approaching labor size in the US by a time fixed effect, the US price index by a combination of a time and a product fixed effects, the productivity term a by GDP per capita and the number of varieties by GDP of the exporter in equation (2), taking logs and indexing by time (t), the relation to estimate for each good (g) that enter the US market becomes:

$$\begin{aligned} log(m_{jt}^g) &= log(GDP_{jt}) + log(GDPcap_{jt}) + (1-\sigma)log(Dist_j) \\ &\quad +(1-\sigma)\eta_1 Contig_j + (1-\sigma)\eta_2 Com.language_j \\ &\quad +\beta S_{k,jt} + \alpha^g + \alpha_t + u_{jt}^g \end{aligned} \quad (10)$$

where α^g and α_t are good and time fixed effects, u_{jt}^g is the residual. The β_k are expected to be negative: an increase in past incident shares, increases current security measures (to prevent potential future incidents), which leads to a decrease in US imports.

We have alternatively run within-form equations where each import value of a given product from any given country is expressed as a deviation from its mean value over the period: $\Delta(log(m_{jt}^g)) = log(m_{jt}^g) - \overline{log(m_{j.}^g)}$, where the overline designates the mean over the period. This alternative equation has the advantage to implicitly although fully account for country fixed effects, along with (country*product) specific effects, that capture the degree of specialization of the country in a given product. Also, by accounting for fixed effects, these within regressions enable to account implicitly for sanctions taken against particular countries like Cuba or Lybia over the period. However, it has the shortcoming to wipe out all time-constant variables. As most of our gravity (distance, contiguity, common language) and other control variables (see below) do not change overtime, we prefer showing mainly the pooled fixed effects regressions. The main within regression results are also shown in the following tables.

All gravity and other control variables in the equation are listed and described in the appendix.

The β coefficients are semi-elasticities as they are coefficients on frequencies (not computed in logs)[10]. At each time we find it necessary, we then convert those coefficients into elasticities at median points. It is important to detail however the computation of elasticities when we introduce our main (interaction) variables π_{jt}^{US} or $\pi(TH)_{jt}^{US}$ that proxy security. As noticed the π type indicators are a product of two frequencies. Their related coefficient, say β_π, represents the semi-elasticity of US imports to these indicators and is quite hard to interpret in simple economic terms. A further simple manipulation, however, enables a much better interpretation of the results.

Consider for instance π_{jt}^{US} (the same reasoning applies to $\pi(TH)_{jt}^{US}$). Notice that π_{jt}^{US} varies with both, past incidents share against the US and past incidents share that originate from j (i.e.$\pi_{jt}^{US} =$

[10]The main reason why we use frequencies in absolute values not logs is because around 50% of the frequencies of incidents have 0 values, see appendix 2

$F^{US_t}.F_{j,t}$). Yet, one can observe from appendix 2 that most of the variation in the data comes from the second term. In fact, the first term, F^{US_t}, varies relatively little : one fourth to one half of the total listed incidents in the world hit the United states across the whole period. Thus, for a better interpretation of the results one can simply fix F^{US_t} to be equal to its average mean 0.35 and then compute the inferred elasticity of US imports to the frequency of past incidents perpetrated by a country of origin j. One obtains:

$$\eta^m_{F_j,t} = 0.35.\beta_\pi.F_{j,t}$$

Needless then to say that because of the skewness of the $F_{j,t}$ distribution (only a very small fraction of origin countries account for most of the incidents), only some few exporting countries to the US should be significantly affected by the incidents. As a matter of fact, the median frequency of incidents perpetrated by an origin country is 1 per thousand and only 1% of the countries are at the origin of more than 95% of world's total incidents over the period (see Appendix 2). Then, for those risky countries, $F_{j,t}$ is very high and thus the corresponding import elasticity η^m is expected to be significant.

Table 4 presents a first set of results. Notice first, that in all the regressions presented the usual variables in the trade literature (GDP, distance, contiguity, common language) appear with the expected signs and magnitudes[11]. The GDP per capita variable appears insignificant however, partly because it might not be a good proxy for productivity at the product level[12].

Column 1 presents a regression where the vector S_j is represented first, by $F^{US}_{j,t} = \frac{n^{US}_{j,t}}{n_t}$, computed at each current year of observation t (i.e. frequency of bilateral incidents, originating from a country j and directly targeting the US). The effect of bilateral incidents appears to be negative on bilateral US imports and statistically significant at 10%, with a semi elasticity of 4.3. The induced elasticity computed at the median point is thus around 0.004, an extremely low figure. Column 2, computes the same indicator but over the last 5 years of observations to avoid possible endogeneity (see prior sections). The effect of terrorism incidents increases by more than 70% although it does not gain much in significance.

In column 3, we show results where we have split those incidents into three categories with respect to their location: those perpetrated against and within the US, those targeting US interests in the origin country of the terrorists and finally, those targeting the US in third countries. It appears that incidents perpetrated within the US, together with incidents in the home country, do not seem to

[11]The impact of distance is around 2 times smaller than in the rest of the literature but this is due to the nature of the panel where only the US is the importer. In fact, as we are accounting for contiguity in our regression, the distance variable looses most of its variability as all potential exporters are now at relatively comparable distances from the US.

[12]We have also run the same type of equations at the aggregate level where we do find a robust positive effect of GDP per capita. Regressions can be provided upon request.

affect significantly US bilateral imports. By a sharp contrast however, incidents perpetrated in third countries appear to affect negatively and very significantly (1%) exports of origin countries to the United States. Now, if computed at median levels, the elasticity is null because the median frequency of incidents perpetrated in third countries is null. But if one believes that the obtained 180 semi-elasticity is representative of the true effect of incidents, perpetrated in whichever location, then the resulting elasticity of incidents at the median point is around 0.18 (i.e: a 1% increase in incidents against the US results in a reduction of their imports of around 0.18%).[13]

Columns 4 and 5 introduce together into the equation the frequency of incidents originating from a country j (against all targets, $F_{j,t} = \left[\frac{n_{j,t}}{n_t}\right]$), and the frequency of incidents against the US (from all countries of origin,$F_t^{US} = \left[\frac{n_t^{US}}{n_t}\right]$), as an alternative to the bilateral frequency of incidents variable. These are also computed over 5 years lags. In magnitude terms, the effects seem to be comparable to those reported earlier in columns 1 and 2. What is important to notice though is that the effects are now much more statistically significant (1%).

Finally, our theory mentions that the interaction of terrorist and US authorities efficiencies should reveal even better the impact on security and thereby trade. We thus introduce to the equation the interaction variable π, as an alternative security proxy. Namely, this is the product of the share of incidents introduced separately in the latter two regressions. Column 6 shows that the corresponding coefficient is negative and statistically very significant. The inferred elasticity η^m computed at the median point (1 per thousand of incidents originating from half of the countries) is around 0.0055: this is to say that for half of the export countries in the sample, a doubling of the frequency of incidents appears to be reducing US imports only by 0.55%. Now, although very small on average, that impact could be much more significant for origin countries at the top of the distribution of incidents. Thus, Colombia, a country associated with more than 20% of incidents against the US in some years can then be highly affected as the corresponding elasticity of US imports to past incidents that originate from these countries is around 1.

In column 7, we split our interaction variable between incidents perpetrated in own country and incidents perpetrated in a third country. Despite a non significant impact regarding incidents in own country, we obtain a very significant and negative effect of incidents located in a different country. Notice here that the third country estimator is around 5 times higher than all-incidents estimator shown in column 6.

[13] In our theory, security measures are imposed by US authorities on US borders. Another "security channel" though could alternatively come from security measures implemented by "source" countries' governments. Indeed, if an origin country of terrorism sends large export volumes to the US, then its government may have a larger economic incentives to prevent terrorism against the US. It thus implements counter terrorist and security policies aimed at reducing terrorist attacks against US interests, on its own territory. One would expect therefore a negative relationship between the volume of US bilateral imports from that "origin country" and the frequency of terrorist incidents against the US in that country. At the same time though, a terrorist organization of the "origin country" would find it relatively easier to hit US interests in a third country (i.e. a location substitution effect). Therefore, by the same token, one would also obtain a positive relationship between the volume of US imports from the "origin country" and the frequency of terrorist incidents in a third country. As incidents perpetrated in third countries appear to affect negatively and very significantly exports of origin countries to the United States, this suggest that such an alternative "security channel" is not empirically important.

Table 5 keeps on using the third country based proxy for exogenous security while introducing progressively all possible controls (column 1 is the benchmark, identical to column 7 in the prior table). As a matter of fact, in order to have a better estimate of the magnitude of the terrorism effect, one needs to control for many other sources that could co-vary independently with terrorism acts on one hand and trade flows on the other. We begin by introducing a set of controls directly related to *cross-border security* between the US and their partners. In column 2 of table 6 , we include a dummy revealing an occurrence of a Militarized Interstate Dispute between a given country and the US, lagged over 10 years of observations as in Glick and Taylor (2005) and Martin, Mayer et Thoenig (2005). The data comes from the Correlates of War project. The sign of the coefficients is negative but not always statistically significant, possibly because we are working on a different panel at the product level. In the next tables we'll see that the impact of war differs across types of products. The inclusion of this measure of cross-border security however, reduces only slightly the magnitude of the coefficient on past terrorism incidents.

Second, there are also some reasons to believe that two countries sharing the same types of political and economic institutions on the one hand could also share lower transaction costs and thus make more trade. On the other hand, this institutional proximity could lower the occurrence of terrorism attacks between them. In order to control for this effect, we add a dummy variable constructed from PolityIV dataset that takes on 1 when the polity variable (a grade that measures the degree of good governance) is as high as that of the US[14], and 0 otherwise. But the effect, although positive, does not appear to be significant and leaves the variable of terrorism incidents unaffected.

We next introduce a series of controls related to insecurity that originate specifically from the exporting country. The objective, here again, is to isolate all the forces that affect both bilateral trade and terrorism incidents. The progressive inclusion of a civil war dummy, a newstate exporter dummy, a proxy of good governance (i.e. polity2 variable in PolityIV, varying from -10 to 10), measures of ethnic or religion fractions (from Alesina et al (2003) dataset), reduce further by a third the magnitude of the coefficient on past frequencies of incidents, although without affecting its high significance in the pooled regression (i.e. estimators reduced from 80 to 57).[15]. Column 9 introduces almost all of the control variables together[16] and shows further that the impact of third countries incidents variable is still significant with a semi-elasticity that reaches 47.

In column 10, as mentioned earlier, we run a within type regression that accounts for (country*product) dyadic effects in order to account for country specialization. The effect of the terrorism variable based on third countries, appear again with a magnitude similar to that obtained from the prior regression, if one accounts for standard errors. To sum up, if the true semi-elasticity is say around 40, the inferred elasticity η^m computed at the median point (1 per thousand of incidents originating from half of the countries) is around 0.015. This is still not a high figure. However, those exporting

[14] The US grade is 10, the maximum that could be obtained by a ranked country

[15] Notice however, that most of these variables appear to be statistically insignificant. Religion Fractions in a exporting country seems however to be good for trade with the US. This result is consistent with Alesina et al (2003) findings concerning the role of this variable on various outcomes.

[16] To avoid multicollinearity, we have removed Ethnic fractions and newstate exporter dummy from the regression

countries which happen to be at the origin of high terrorism activities over the period like Colombia (more than 20% share of total incidents in some years), tend to be associated with an elasticity of at least 2.8, almost three times as much as that estimated earlier.

A last important point to make in this section is that terrorism incidents should not only affect negatively the intensity of already traded flows but also the probability of start (or stop) exporting to the US in a given product. Hence, the total impact of terrorism incidents should be higher (in absolute value) once one accounts for both positive and zero flows. In order to check for this, column 11 presents the results of Santos Silva and Tenreyro's (2006) Poisson gravity specification, known to account for heterogeneity problems while controlling for all zero trade flows[17]. Because of insufficient memory problems in Stata, we could not run the regression for all zeros and positive trade observations in our dataset. That is why the results here are shown for a 10% random sample[18]. Accounting for the same fixed effects than in columns 1 to 9, these results appear to be qualitatively in line with the results of the latter. Besides, as expected, the impact of the security proxy based on past terrorism (in third countries), is now three time higher than that shown in column 9.

In the next section however, in order to avoid STATA memory problems and account for all positive trade flows, we stick to the complete specification shown in column 9.

6 Terrorism to Reveal Security

Although we have introduced many controls, we still need to show further that what we are picking is really a specific terrorism effect. Besides, we lack variables describing directly security measures. Thus, although consistent with our story, we could not prove so far empirically that the relationship between terrorism incidents and trade is really due to those measures. This section tries to go further into investigating the relationship between trade and terrorism through the security channel.

6.1 The impact of human victims

In order to see first whether we are really capturing a specific terrorism effect, we interact the variable of past incidents shares with the average number of human victims per incident perpetrated by the terrorists of a given country j. Only incidents in third countries are considered here, as we know from the previous section that they seem to pick up most of the exogenous effect of terrorism on security and trade. We expect those incidents with high number of victims to affect even more current security measures and thus bilateral US imports.

Table 6, column 1, shows the results for the complete specification. We define incidents as being relatively harmful in terms of casualties when they result in a number of human victims (deaths and injuries) higher than the standard deviation from the average in the sample. The average number of victims in the sample is around 3 by incident while the deviation is around 10. Then, we construct

[17] A Tobit regression produces qualitatively the same results

[18] After a detailed check, our results appear to be very robust to the size of the random sample

a dummy that takes value 1 when the resulting number of victims passes 13 (i.e. higher than the average+std) and 0 otherwise. The interaction term in column 1 (table 6) is negative but statistically insignificant. The impact of victims becomes statistically significant however when their number appears to be higher than 5 standard deviations (i.e. more than 50 victims). Column 2 shows indeed that the negative effect on US imports is up to three times higher when the incident is very harmful.

The number of victims variable is a specific feature of terrorism and hence is consistent with the view that we are really picking up the impact of terrorism on trade (at least for very high levels of victims). However, we still do not know whether this impact is truly coming from high security measures at the borders or whether it is due to higher insurance costs, or a boycott effect from US consumers. We develop in what follows a strategy that could help us identify better the security effect.

6.2 Discussing further the security effect hypothesis

By taking advantage from trade observed at the bilateral and product levels, we take three further routes to analyze whether or not the impact of terrorist incidents are informing on security measures taken at the border.

First, recalling our theory, we expect small partners of the US to be much more affected from terrorism than its big partners. The reason is that American citizens' welfare should be more dependent on big trading partners which then incite US authorities to limit their security measures towards the latter. In that respect, higher terrorism activities in the past might be more harmful to small partners, but less harmful to big partners. Table 6, column 3, shows indeed that when the GDP of the partner increases the effect of terrorism incidents that originate from the latter decreases on US imports [19]. This size effect does not alter however that of the high-number of victims. This suggest then that the country size effect does matter but for incidents that do not result in a high number of victims.

Second, if terrorism increases security controls at the borders then we expect terrorism acts to result in higher time spent at the borders. Thus, time-sensitive products should be much more affected by terrorism than time-insensitive ones. We take advantage from a study by Hummels (2002) where he estimates the average sensitivity of days spent in transport on trade at the SITC2 product level. We classify those products where time-sensitivity of trade is higher than -0.01 (and statistically significant) into a time-sensitive product category and the rest, usually around 0.005, into a time-insensitive categorie[20]. Table 6 again, shows that indeed time-sensitive products are more sensitive to terrorism acts than the rest. They are even more than 4 times more sensitive when the number of victims per incident is very high.

Third, we expect that terrorism against the US affects more differentiated than homogenous products. As a matter of fact, in the case of differentiated products the information to obtain on product

[19] We also find the same qualitative result when we interact the third incidents variable with a dummy that takes on 1 when the size of the country in terms of GDP is higher than the median size country.

[20] Standard error of the estimates were not provided. Hence, we could not compare statistically the level of estimators with each others. That is why we have chosen the threshold method where 0.01 seemed to be a clear cut between insensitive and sensitive-time products.

characteristics is costly. It usually implies face to face discussions, phone calls and other communication technologies in order to sell the associated product. This is not the case for homogenous or referenced products for which information is easily found on the market or in magazines respectively. After terrorist attacks, security measures can be set to control communication devices and/or limit the movement of foreign but also US businessmen in and out of the US borders. Thus, if security at the border matters, we expect products where market information is costly (i.e. need more businessmen mobility and time to communication) to be more sensitive to terrorism acts in the past than those products negotiated on global markets where information on prices and quantities is readily available. We thus split the sample by three sets of products classified by Rauch (1996) into products in organized exchange, referenced prices products and differentiated products. Table 6 shows the result for the three subsamples: In the case of organized exchange products, the impact of incidents is insignificant even when they result in a high number of victims. In the case of referenced price products, the impact is as high as for differentiated products (semi elasticity around 52). In the latter case however, when those acts result in a high number of victims, the interaction term shows that the sensitivity to terrorism acts is about 5 times higher.

This last result is interesting to discuss in the perspective of the alternative boycott explanation of the effect of terrorism on bilateral trade flows. If indeed, a change in US consumers' preferences is the explanation of the negative impact on US imports of terrorist incidents emanating from origin countries, then we should expect this boycott effect to be stronger on standard and referenced goods than on differentiated products, as the first can be more easily substituted towards alternative supply sources. The fact that the impact of terrorist incidents on differentiated products is stronger than on standard products, suggests on the contrary that a change in US consumers preferences is unlikely to be an important explanation of the negative impact of transnational terrorism on US bilateral trade flows. The following section goes further in confirming that the security channel is more empirically consistent with the data.

6.3 Terrorism, Visas and US Imports

Next, we pursue our investigations by running a series of regressions where we employ a true variable of bilateral security at the borders but on a smaller period. We assemble data on the number of non-immigrant visa issuances by partner country from 1997 to 2002 (last year of our US imports dataset). These data are provided online by the US Department of State[21]. We chose to work on the number of visas issued for Business (B1) and Business and Leisure (B1-2), assuming that those who come for both Business and Leisure decide to do so primarily for business activities[22].

Now, the rate of visas issued (i.e. ratio of number of visas to total visas demand) would have been even a better proxy for security, as it informs on the number of visa denied as well by the

[21] http://travel.state.gov/visa/frvi/statistics/statistics 1476.html

[22] Only citizens of countries that are not part of the Visa Waiver Program are included in our analysis. Hence, most of the OECD countries, part of this program, are not included in the panel because their nationals do not need visas in general to enter the US for Business or Leisure for a short stay (under 3 months).

United States. However, and probably for political reasons, we could not find this information on the Department of State website.

We want to investigate whether the impact of terrorism incidents on trade in differentiated (network-related) products is transiting through the number of issued visas for Business. Hence, first we study the relationship between terrorism incidents and the number of visas issued (this is to be called our empirical model 1, hereafter) and second, we study the link between the visas and trade in differentiated products (model 2 with alternative specifications, hereafter).

From Models 1 and 2 one can then infer the effect of visas on trade that is induced by terrorism incidents.

Table 7 presents the results. As mentioned earlier, it is important to note that the only observations used in this table concern countries which nationals need a business or a business and leisure visa to enter the US from 1997 to 2002. The first two columns present two alternative econometric methods (Product/year fixed effects and Within) to explain bilateral issuance of visas for businessmen using mainly gravity variables along with our 2 variables of interest: terrorism variables based on origin and third countries. Interestingly, and perhaps for some endogeneity reasons that are out of the scope of this paper, incidents set in countries of origin do not seem to be robust to explain bilateral visa allowance. However, in both econometric methods, we do find that incidents located in third countries exhibit robust negative effects on bilateral visa issuance. That is, an incident set by groups outside their country of origin has negative spillovers on business people traveling from that country to the US.

Columns 3 to 5 investigate on the other hand, the impact of business visas on US imports. We expect the effect to be positive and statistically significant for differentiated products, and no effect for organized exchange products. Column 5 confirms the first intuition: namely a 10% increase in visa issuing increases by more than 5% trade with US in differentiated products. However, the effect of business visas appears to be negatively affecting trade in organized exchange.

Columns 6 to 8 add up the incidents and the visas variables together[23]. If the incidents were to affect trade significantly through visas allowances, their inclusion would reduce the coefficient on the visa variable. This, however, does not appear to be the case: in differentiated products, incidents still impact upon trade independently from business visas (the latter appearing with almost unchanged coefficients). [24] These results suggest two negative and statistically significant effects of terrorism on trade in differentiated products: the first affects trade directly or through some unobserved channel of counter-terrorism; the second effect translates through a reduction in business visas (model 1 results in columns 1 to 3). Besides, both effects are large in magnitude compared to the corresponding effects in referenced price products or homogenous products.

We have also run an instrumental variable regression where the number of business visas has been instrumented by the regressors in model 1, along with other external instruments (see columns 9 to

[23]We thank an anonymous referee to point this out in his report.

[24]Notice that the coefficients in table 6 and table 7 cannot compare to each others because the countries and period considered are different. It is not due at all to the inclusion of business visa in table 7. A regression including incidents without business visas provides comparable coefficients again on incidents.

11 and footnote of table 7).[25]. The results in columns 9 to 11 appear to be similar to those shown in columns 6 to 8 respectively. From the IV regression one can then easily compute the total elasticity of incidents on US imports via its direct and indirect components. Indeed, the indirect elasticity at the median point (1 per thousand incidents) would be the product of the elasticity of trade to visas and that of visas to incidents shares: $\eta = (0.50) * (80 * 0.001 * 0.35) \approx 0.014$. To this effect one has to add the direct elasticity component: $(273 * 0.001 * 0.35) \approx 0.09$, the latter appearing to be 6.5 times higher than the indirect visa-induced effect.

Summarizing, the previous discussion suggests two features. First, incidents matter for visas and visas matter for trade in differentiated products. Second, a significant part of the effect of incidents on trade are still however independent from the visas.

7 Conclusion

In this paper, we have asked what is the impact of security, to prevent terrorism, on bilateral trade. To this end we have set up a theory which shows that the impact goes not only from terrorism to trade. Trade might, in turn, increase the probability of terrorism acts.

Our theory however, allows for a strategy to condition out the latter, in order to identify the true impact of terrorism. We have shown in particular, how past incidents located in third countries (anywhere in the world except the origin or the target country) can constitute good instruments of current security measures at the borders of the latter.

We have run our tests on US imports. We have shown that past terrorist acts, perpetrated by groups from a given country against the US, affect its exports to the latter. The level of the impact is multiplied by three when the acts result in a relatively 'high' number of victims (ie. higher than a standard deviation from the mean number of victims over the period). To fix ideas, a 1% increase in the frequency of terrorism acts originating from a high-terrorism origin country, say Colombia, against the US, reduces imports from Colombia by 3%. This effect reaches a striking 10% decrease in US imports when terrorism attacks have important victim consequences. But this high figure is rather an exception. Only 1 percent of the countries (i.e. the most risky ones) are associated with significant effects on their exports to the US. For an extreme majority of cases, the elasticity of US imports is very much lower.

Further, we have found that the negative impact of terrorism is two to three times higher for products that are sensitive to time of shipping and those that are sufficiently differentiated. Further, using an additional dataset from the department on state on visa issuance from 1997 to 2002, we have shown that part of the effect of terrorism in the differentiated product markets translates through a smaller number of business visas delivered by the US following terrorism incidents. But this accounts only for 1/6 of the total effect of terrorism on these products.

[25]Because of high multicollinearity between gdp, gdp per capita and the business visas variable that is predicted in model 1, we had to move GDP to the left hand side by constraining the coefficents on GDP to be the same as those in columns 6 to 8

What can we conclude from these results? As long as US imports come mainly from countries that do not represent a high risk in terms of terrorism acts, the US consumers should not be too much affected by security measures at the borders. However, those few countries at the origin of most of the attacks towards the US could be highly affected, especially those countries for which the US often constitutes a significant market for their export products. Hence, the protection of US lives might be undertaken at the expense of some foreign less developed countries' economies.

Our results are consistent with the role played by security measures at the borders. It should be noted however that other elements might as well affect the nexus between trade and transnational terrorism. For instance, changes in the behaviors of insurers (higher rates of insurance prices) or changes in consumer choices (discrimination and embargo) could also affect trade and consequently terrorist attacks.

Besides, we assign in this paper each terrorist attack to one particular origin. We know however that this is only partly true in today's changing forms of terrorism where terrorist organizations are increasingly becoming more multinational. Put differently, this paper does not study the indirect impact of terrorism from one country of origin on security measures over other suspected countries, which for instance might host groups from the same 'multinational' organization. One might argue that the indirect impact can be substantial as well. All these issues that arise naturally from our work, deserve to be specifically investigated in future research.

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Appendix 1: Existence of a Bayesian Nash equilibrium security vector $S = (S_1^*, \ldots S_N^*)$ in the multi-country terrorist case:

Transactions costs between countries 0 and j take the exponential form:

$$T_{0j}(S) = T_j \; e^{\beta S_j} \text{ with } \beta > 0$$

Let us denote the following Assumption :

$$\textbf{Assumption } A : \sigma < 1 + \frac{\varphi \left[E(\sqrt{\theta})\right]^2}{\beta V_j} \quad \text{for all } j \in [1, K]$$

Then we have the following result :

- *Under assumption A, there is a unique Bayesian Nash equilibrium of the security-terrorism game between country 0 and the K terrorist organizations. It is characterized by an equilibrium security vector* $S = (S_1^*, \ldots S_N^*)$*, and an equilibrium terrorist vector* $\left(R_j^{L*}\right)_{i\in[1,K]}$ *,(resp.* $\left(R_j^{H*}\right)_{i\in[1,K]}$*) associated to the realization* $\theta = \theta^L$ *(resp.* $\theta = \theta^H$*) of the terrorist resource cost.*

Equation (6) rewrites

$$\frac{m_{0j}\beta}{\mu} = \frac{1}{S_j} - \sqrt{\frac{\varphi}{V_j}} E(\sqrt{\theta}) \frac{1}{\sqrt{S_j}}$$

with

$$m_{0j} = \frac{L_j T_{0j}^{1-\sigma}}{\sum\limits_{h=0}^{h=N} L_h T_{0h}^{1-\sigma}} = \frac{L_j e^{\beta(1-\sigma)S_j}}{\sum\limits_{h=0}^{h=N} L_h e^{\beta(1-\sigma)S_h}}$$

Hence

$$\frac{L_j e^{\beta(1-\sigma)S_j}}{\sum\limits_{h=0}^{h=N} L_h e^{\beta(1-\sigma)S_h}} = \frac{\mu}{\beta}\left[\frac{1}{S_j} - \sqrt{\frac{\varphi}{V_j}} E(\sqrt{\theta}) \frac{1}{\sqrt{S_j}}\right] \text{ for all } j \in [1, K]$$

and

$$S_j = 0 \text{ for } j \in [K, N]$$

Denote

$$A = \sum_{h=0}^{h=N} L_h e^{\beta(1-\sigma)S_h}$$

and consider the equation

$$L_j e^{\beta(1-\sigma)S_j} = \frac{A\mu}{\beta}\left[\frac{1}{S_j} - \sqrt{\frac{\varphi}{V_j}} E(\sqrt{\theta}) \frac{1}{\sqrt{S_j}}\right] \quad \text{for } S_j \leq \frac{V_j}{\varphi \left(E(\sqrt{\theta})\right)^2}$$

It is easy to see that for $\sigma < 1 + \frac{\varphi\left[E(\sqrt{\theta})\right]^2}{\beta V_j}$ it generates a unique solution $S_j(A)$. As a matter of fact, the function

$$\Psi(S) = L_j e^{\beta(1-\sigma)S} - \frac{A\mu}{\beta}\left[\frac{1}{S} - \sqrt{\frac{\varphi}{V_j}} E(\sqrt{\theta}) \frac{1}{\sqrt{S}}\right]$$

is continuous and such that $\Psi(0) = -\infty$ and $\Psi(\frac{V_j}{\varphi\left(E(\sqrt{\theta})\right)^2}) = L_j e^{\beta(1-\sigma)\frac{V_j}{\varphi\left(E(\sqrt{\theta})\right)^2}} > 0$. By the theorem of intermediate values there is at least one value $S_j(A)$ which is such that $\Psi(S_j(A)) = 0$. The value is unique because for any S such that $\Psi(S) = 0$ and $S \leq \frac{V_j}{\varphi\left(E(\sqrt{\theta})\right)^2}$, one has $\Psi'(S) > 0$. As a matter of fact

$$
\begin{aligned}
\Psi'(S) &= L_j\beta(1-\sigma)e^{\beta(1-\sigma)S} + \frac{A\mu}{S\beta}\left[\frac{1}{S} - \sqrt{\frac{\varphi}{V_j}}\frac{E(\sqrt{\theta})}{2}\frac{1}{\sqrt{S}}\right] \\
&= -\beta(\sigma-1)\frac{A\mu}{\beta}\left[\frac{1}{S} - \sqrt{\frac{\varphi}{V_j}}E(\sqrt{\theta})\frac{1}{\sqrt{S}}\right] + \frac{A\mu}{S\beta}\left[\frac{1}{S} - \sqrt{\frac{\varphi}{V_j}}\frac{E(\sqrt{\theta})}{2}\frac{1}{\sqrt{S}}\right] \\
&> \frac{A\mu}{\beta}\left[\frac{1}{S} - \sqrt{\frac{\varphi}{V_j}}\frac{E(\sqrt{\theta})}{2}\frac{1}{\sqrt{S}}\right]\left(\frac{1}{S} - \beta(\sigma-1)\right) \\
&> \frac{A\mu}{\beta}\left[\frac{1}{S} - \sqrt{\frac{\varphi}{V_j}}\frac{E(\sqrt{\theta})}{2}\frac{1}{\sqrt{S}}\right]\left[\frac{\varphi\left[E(\sqrt{\theta})\right]^2}{V_j} - \beta(\sigma-1)\right] > 0
\end{aligned}
$$

Hence there can only a unique solution of $\Psi(S_j(A)) = 0$. The situation is depicted by a picture identical to figure 2 in the main text. It is easy to see as well that

$$
\frac{dS_j}{dA} = -\frac{\mu}{\beta}\left[\frac{1}{S} - \sqrt{\frac{\varphi}{V_j}}E(\sqrt{\theta})\frac{1}{\sqrt{S}}\right]\frac{1}{-\Psi'(S)} > 0
$$

and that $\lim_{A\to 0} S_j(A) = 0$ and $\lim_{A\to\infty} S_j(A) = \frac{V_j}{\varphi\left(E(\sqrt{\theta})\right)^2}$

Now we get the equilibrium value of A from the following equation:

$$
A = \Phi(A) = \sum_{h=0}^{h=N} L_h e^{\beta(1-\sigma)S_h(A)}
$$

$\Phi(A)$ is decreasing in A (recall that $S_h(A)$ is increasing in A and $\sigma > 1$). In $A = 0$, it has a positive value and it remains bounded when A goes to infinity, From this $\Phi(A) - A$ is strictly decreasing with value $\Phi(0) > 0$ at 0 and value $-\infty$ for A tending to ∞. Hence there is a unique A^* satisfying $A = \Phi(A)$.

Once we know A^*, we can recover the equilibrium security vector $S^* = [S_j(A^*)]_{j\in[1,K]}$, the corresponding equilibrium efforts of terrorism of each group $R_j^{L*} = R(S_j(A^*, \theta^L))$ and $R_j^{H*} = R(S_j(A^*, \theta^H))$ and the probability of non occurrence of a terrorist act in country as

$$
E(\Phi_0) = 1 - \Pi_{i=1}^{i=K}\left[\nu_j^L \frac{{R_j}^{L*}}{\left[R_j^{L*} + \varphi S_j^*\right]} + (1-\nu_j^L)\frac{{R_j}^{H*}}{\left[{R_j}^{H*} + \varphi S_j^*\right]}\right]
$$

Trade flows are immediately obtained from

$$
m_{0j} = \frac{L_j T_{0j}^{1-\sigma}}{\sum_{h=0}^{h=N} L_h T_{0h}^{1-\sigma}} = \frac{L_j e^{\beta(1-\sigma)S_j^*}}{\sum_{h=0}^{h=N} L_h e^{\beta(1-\sigma)S_h^*}}
$$

QED.

Appendix 2: Bayesian revision of beliefs after past terrorism in a third country.

We provide here a simple justification of why beliefs of the government can be correlated to past terrorist actions in third countries. Consider the following timing. At the beginning of the period, a terrorist organization k tries to hit citizen or economic interests of country 0 in the rest of the world but not in country 0 itself. The technology is the same as before, namely in country $j \neq 0$, a terrorist organization k maximizes

$$Max_{R_k^j}\ \Pi\left(R_k^j, S_k^j\right) V_k^j - \theta_k R_k^j$$

where $\Pi\left(R_k^j, S^j\right)$ is the probability of success of a terrorist act in country j committed by organization k against country 0. with

$$\Pi\left(R_k^j, S^j\right) = \frac{R_k^j}{R_k^j + \varphi S_k^j}$$

which depends positively on the amount of resources R_k^j invested by the terrorist organization and negatively on some specific factor S_k^j to country j (security measures, environment, political stability links between countries k and j, etc...). θ_k is the marginal resource cost of the terrorist organization and V_k^j is the perceived visibility gain that is enjoyed by the terrorist organization when the terrorist act is successful in country j against country 0.

The solution of (3) gives immediately: the reaction curve of terrorist group k in country j

$$R_k^j = R(S^j, \theta_k) = \sqrt{\frac{\varphi S_k^j V_k^j}{\theta_k}} - \varphi S^j$$

and the frequency of terrorist acts by organization k in country j against country 0 is

$$\pi_k^j = 1 - \sqrt{\frac{\varphi \theta_k S_k^j}{V_k^j}}$$

as θ_k can only take two values θ^L and θ^H with $\theta^L < \theta^H$, let us denote ν_{0k}^L and $\nu_{0k}^H = 1 - \nu_{0k}^L$ respectively the initial beliefs that the government of country 0 has on the value of θ_k. Assume also that S_k^j / V_k^j is iid distributed across countries and follows a density law $f(.)$

Then applying Bayes' law gives us the revised belief of the government of country 0 after having observed π_k^j in country j

$$\nu_{1k}^L = \frac{\nu_{0k}^L f(\frac{\left[1-\pi_k^j\right]^2}{\varphi\theta_L})}{\nu_{0k}^L f(\frac{\left[1-\pi_k^j\right]^2}{\varphi\theta_L}) + (1-\nu_{0k}^L) f(\frac{\left[1-\pi_k^j\right]^2}{\varphi\theta_H})}$$

or the odd ratio can be written as :

$$\frac{1-\nu_{1k}^L}{\nu_{1k}^L} = \frac{1-\nu_{0k}^L}{\nu_{0k}^L} \frac{f(\frac{\left[1-\pi_k^j\right]^2}{\varphi\theta_H})}{f(\frac{\left[1-\pi_k^j\right]^2}{\varphi\theta_L})}$$

and after the observation of all countries but 0 , one gets in the end:

$$\frac{1-\nu_{1k}^L}{\nu_{1k}^L} = \frac{1-\nu_{0k}^L}{\nu_{0k}^L} \prod_{j=1}^{j=N} \left[\frac{f(\frac{\left[1-\pi_k^j\right]^2}{\varphi\theta_H})}{f(\frac{\left[1-\pi_k^j\right]^2}{\varphi\theta_L})}\right]$$

To fix ideas, consider the case where S_k^j/V_k^j is exponentially distributed $f(x) = \lambda e^{-\lambda x}$. Then we get

$$\frac{1-\nu_{1k}^L}{\nu_{1k}^L} = \frac{1-\nu_{0k}^L}{\nu_{0k}^L}\ e^{-\frac{\lambda}{\varphi}\left[\frac{1}{\theta_H}-\frac{1}{\theta_L}\right]\left[\sum_{j=1}^{j=N}\left[1-\pi_k^j\right]^2\right]}$$

It is easy to see immediately that ν_{1k}^L is an increasing function of π_k^j (the probability of success of a terrorist action by organization k in country j)

Appendix 1: sources of data

Variables	Dataset	Dimensions	period selected	Documentation
Terrorism incidents	ITERATE dataset	Origin, Target and Location Countries* and time	1968-2003	1968-1977: Inter-university Consortium for Political and Social Research (1982) and 1978-2003: Mickolus, Sandler, Murdock and Flemming (2004)
US bilateral imports	1/ NBER World trade dataset (Feenstra and Lipsey) and 2/ Flubil-INSEE dataset	Country Pairs, SITC4/5 product level and Time	1968-2002	www.nber.org and francoise.le-gallo@insee.org
GDP, GDP per capita	World Development Indicators (Worldbank)	Countries and time	1968- 2002	www.worldbank.org/data
Distance, Contiguity, English Common Language	CEPII (Paris)	Country pairs	no time series	www.cepii.fr/francgraph/bdd/distances.htm
Military Interstate Dispute (MID)	MID Data v3.02 from Correlates of War Project (COW)	yearly and bilateral	1968-2002	http://www.correlatesofwar.org/
State Governance (Polity2)	Polity IV project	Country and time	1968-2002	www.cidcm.umd.edu/inscr/polity/
Civil War	Civil War Resolution dataset	country and year	1968-2002	Barbara Walter (www-irps.ucsd.edu/academics/f-walter-data.php)
Ethnic, Religious Fractions	Fractionalization data By Alesina, Devleeschauwer, Easterly and Kurlat (2003)	Country data (only one observed year by country, generally between 1980 and 2001)	no time series	http://www.stanford.edu/ wacziarg/papersum.html

* 'Origin' (resp. 'Target') is the country of first nationality of terrorist group (resp. Human and Physical victims).

Appendix 2: Descriptive Statistics on Victims and Frequency of incidents (in the last 5 years)

Variable	Label	Mean	Median	Std. dev	5th Ptcl	95th Pctl	99th Pctl	Maximum	Origin of Max. frequencies
F_t^{US}	Freq. of total incidents against the US	0.352	0.319	0.104	0.228	0.564	0.672	0.672	
NV_j	Number of victims per incident originating from j	3.122	0.2	10.293	0	18.15	61.209	173.76	Saudi Arabia
F_{jt}	Freq. of incidents originating from j	0.006	0.001	0.013	0	0.026	0.049	0.261	Cuba
$F(Orig)_{jt}$	Freq. of incidents originating from and located in j	0.004	0.001	0.012	0	0.021	0.037	0.208	Colombia
$F(Third)_{jt}$	Freq. of incidents originating from j but located in third country	0.002	0	0.005	0	0.009	0.022	0.261	Cuba
π_{jt}^{US}	$F_{jt}.F_t^{US}$ proxy of $\varphi_0^{US}.E(\sqrt{\theta})_i^2$	0.002	0	0.005	0	0.009	0.017	0.125	
$\pi(Orig)_{jt}^{US}$	$F(Orig)_{jt}.F_t^{US}$	0.001	0	0.005	0	0.007	0.014	0.1	
$\pi(Third)_{jt}^{US}$	$F(Third)_{jt}.F_t^{US}$	0.001	0	0.002	0	0.003	0.007	0.125	

Table 1: Rankings of Origin Countries across periods

Origin Country	All period (1968-2003) Total ranking	All period (1968-2003) Total incidents	1968-1978 incidents	1968-1978 rank	1978-1988 incidents	1978-1988 rank	1988-1998 incidents	1988-1998 rank	1998-2003 incidents	1998-2003 rank	1968-2003 Growth of incidents share**
UNO*	1	4002	1357	1	1352	1	1051	1	242	1	-38,18%
PAL	2	823	409	2	240	2	138	3	36	4	-69,49%
COL	3	457	36	12	120	7	146	2	155	2	**1392,53%**
TUR	4	292	46	10	169	4	63	10	14	15	5,50%
IRN	5	275	16	27	162	5	90	5	7	22	51,66%
LBN	6	236	21	20	178	3	34	17	3	40	-50,48%
CUB	7	220	161	3	45	19	10	42	4	30	-91,39%
ESP	8	207	31	15	122	6	49	13	5	26	-44,09%
GRC	9	207	36	12	85	10	71	9	15	13	44,44%
PHL	10	206	20	23	89	9	80	7	17	12	194,65%
GBR	11	169	63	7	64	14	34	17	8	19	-55,98%
PER	12	164	7	38	78	12	75	8	4	30	98,09%
USA	13	162	77	6	72	13	11	38	2	45	-91,00%
ARG	14	160	137	4	13	36	9	46	1	55	-97,47%
PRI	15	153	91	5	62	15	0		0		-100,00%
KUR	16	131			27	27	104	4	0		0,00%
FRA	17	130	53	8	60	16	10	42	7	22	-54,22%
RFA	18	126	33	14	91	8	2	76			-100,00%
SLV	19	119	14	29	79	11	26	20			-100,00%
ITA	20	110	52	9	40	20	8	51	10	17	-33,34%
SOM	21	95	1	65	1	81	85	6	8	19	**2673,21%**
IRQ	22	86	8	35	36	23	23	21	19	9	723,30%
DZA	23	83	8	35	3	68	57	11	15	13	549,97%
KOR	24	83			46	18	37	16			0,00%
GTM	25	80	21	20	40	20	19	25			-100,00%
YUG	26	77	37	11	23	28	12	34	5	26	-53,16%
PAK	27	75	5	42	12	40	18	26	40	3	**2673,21%**
JPN	28	69	22	19	32	24	14	30	1	55	-84,24%
IND	29	66	17	25	22	29	21	23	6	24	22,35%
LBY	30	65	1	65	56	17	8	51			-100,00%
EGY	31	63	2	57	13	36	42	14	6	24	939,96%
CHL	32	59	4	47	16	34	38	15	1	55	-13,34%
IDN	33	57	15	28	4	62	4	64	34	5	685,74%
KHM	34	54	1	65	2	71	51	12			-100,00%
YEM	35	52			1	81	27	19	24	6	
AGO	36	45	3	51	10	41	9	46	23	8	**2557,66%**
PRT	37	45	5	42	38	22	1	89	1	55	-30,67%
HND	38	44			30	25	14	30			0,00%
NIC	39	41	13	31	18	31	9	46	1	55	-73,33%
ISR	40	40	18	24	13	36	8	51	1	55	-80,74%
JOR	41	40	5	42	22	29	9	46	4	30	177,32%
MEX	42	40	28	16	8	45	2	76	2	45	-75,24%
BOL	43	38	21	20	7	48	10	42			-100,00%
MOZ	44	36			28	26	8	51			
RUS	45	34			17	33	16	28	1	55	
SLE	46	34					10	42	24	6	
ETH	47	33	11	33	10	41	11	38	1	55	-68,49%
SAU	48	33	1	65	1	81	12	34	19	9	**6486,38%**
LKA	49	32	1	65	6	50	21	23	4	30	1286,61%
ZWE	50	32	12	32	18	31	1	89	1	55	-71,11%
AFG	51	31	1		5	56	13	32	13	16	**801,29%**
ERI	52	27	26	17	1	81					-100,00%
URY	53	27	26	17					1	55	-86,67%
SDN	54	26			10	41	13	32	3	40	
VEN	55	26	14	29	5	56	3	70	4	30	-0,96%
BIH	56	25					23	21	2	45	
SYR	57	23	1	65	13	36	8	51	1	55	246,65%
NGA	58	22	1	65	1	81	2	76	18	11	**6139,73%**
DEU	59	20					17	27	3	40	
PAN	60	20	3	51	6	50	11	38			
Total		10772	3106		3887		2884		896		

*UNO=Unknown Origin

** calculations are based on the relative growth between the share of incidents in the first decade (1968-1978) and that of the last period considered (1998-2003). When the country has not been associated with incidents in first decade, the second decade is taken to compute the related growth rate of incidents.

Table 2: Rankings of Targeted Countries across periods

	All Period (1968-2003)		*1968-1978*		*1978-1988*		*1988-1998*		*1998-2003*		1968-2003
Targeted Country	***Rank***	**Total_incidents (1968-2003)**	**incidents**	***rank***	**incidents**	***rank***	**incidents**	***rank***	**incidents**	***rank***	Growth share of incidents**
USA	*1*	3822	1385	*1*	1125	*1*	854	*1*	458	*1*	14,60%
FRA	*2*	649	75	*6*	368	*2*	180	*2*	26	*4*	20,13%
ISR	*3*	647	385	*2*	140	*5*	98	*7*	24	*5*	-78,40%
GBR	*4*	581	120	*3*	216	*3*	170	*3*	75	*2*	116,59%
TUR	*5*	310	32	*15*	126	*6*	146	*4*	6	*20*	-35,02%
RUS	*6*	276	65	*7*	86	*9*	115	*6*	10	*12*	-46,69%
UNO*	*7*	269	30	*16*	191	*4*	44	*11*	4	*24*	-53,79%
ITA	*8*	266	39	*11*	114	*7*	93	*8*	20	*6*	77,71%
INT*	*9*	253	19	*20*	51	*15*	133	*5*	50	*3*	811,95%
RFA	*10*	212	117	*4*	95	*8*					-100,00%
ESP	*11*	218	82	*5*	62	*10*	62	*9*	12	*10*	-49,29%
PAL	*12*	130	51	*9*	59	*12*	20	*23*			-100,00%
JPN	*13*	123	18	*24*	46	*16*	56	*10*	3	*29*	-42,24%
IND	*14*	119	34	*14*	37	*19*	34	*13*	14	*9*	42,69%
CHE	*15*	107	20	*19*	56	*14*	22	*20*	9	*14*	55,94%
IRN	*16*	106	17	*26*	60	*11*	29	*14*			-100,00%
NLD	*17*	98	35	*13*	32	*23*	20	*23*	11	*11*	8,91%
YUG	*18*	97	48	*10*	37	*19*	10	*45*	2	*34*	-85,56%
CUB	*19*	96	56	*8*	24	*29*	11	*41*	5	*22*	-69,06%
UFN	*20*	91	29	*17*	19	*36*	27	*15*	16	*7*	91,19%
VEN	*21*	91	14	*28*	31	*25*	40	*12*	6	*20*	48,52%
BEL	*22*	79	10	*34*	32	*23*	22	*20*	15	*8*	419,81%
EGY	*23*	72	23	*18*	31	*25*	18	*26*			-100,00%
CAN	*24*	71	13	*31*	21	*34*	27	*15*	10	*12*	166,57%
IRQ	*25*	70	14	*28*	43	*17*	12	*38*	1	*49*	-75,25%
IRL	*26*	68	36	*12*	18	*38*	11	*41*	3	*29*	-71,12%
LBY	*27*	63			59	*12*	4	*75*			
PRT	*28*	58	8	*40*	36	*21*	10	*45*	4	*24*	73,27%
NIC	*29*	57	11	*32*	33	*22*	13	*37*			-100,00%
CHL	*30*	55	19	*20*	26	*28*	10	*45*			-100,00%
SWE	*31*	55	11	*32*	23	*31*	18	*26*	3	*29*	-5,49%
AUT	*32*	50	10	*34*	21	*34*	18	*26*	1	*49*	-65,35%
COL	*33*	50	14	*28*	16	*42*	12	*38*	8	*16*	98,02%
MEX	*34*	50	18	*24*	16	*42*	14	*34*	2	*34*	-61,50%
SAU	*35*	50	2	*60*	24	*29*	23	*19*	1	*49*	73,27%
KWT	*36*	49	4	*53*	38	*18*	7	*56*			-100,00%
ZAF	*37*	49	9	*38*	22	*33*	14	*34*	4	*24*	54,02%
GRC	*38*	43	7	*43*	16	*42*	18	*26*	2	*34*	-0,99%
AUS	*39*	42	2	*60*	15	*45*	17	*30*	8	*16*	1286,16%
SYR	*40*	41	10	*34*	27	*27*	4	*75*			-100,00%
CHN	*41*	40			12	*50*	26	*17*	2	*34*	
JOR	*42*	39	8	*40*	17	*40*	10	*45*	4	*24*	73,27%
ARG	*43*	36	15	*27*	14	*47*	5	*67*	2	*34*	-53,79%
BRA	*44*	34	6	*45*	9	*54*	19	*25*			-100,00%
LBN	*45*	34	19	*20*	11	*53*	4	*75*			-100,00%
NAT	*46*	33			23	*31*	8	*52*	2	*34*	
PHL	*47*	32	1	*78*	9	*54*	14	*34*	8	*16*	2672,32%
POL	*48*	32	5	*48*	8	*58*	15	*33*	4	*24*	177,23%
CYP	*49*	31	2	*60*	19	*36*	10	*45*			-100,00%
KOR	*50*	30	2	*60*	9	*54*	17	*30*	2	*34*	246,54%
Total		***10772***	***3105***		***3887***		***2884***		***896***		

** INT=International Organizations; UNO=Unknown Targeted country*

**Calculations are based on the relative growth between the share of incidents in the first decade (1968-1978) and that of the last period considered (1998-2003). When the country has not been associated with incidents in first decade, the second decade is taken to compute the related growth rate of incidents.

Table 3: Ranking of incidents by Origin and Target Countries across periods

Origin	Target	All Period (1968-2003)		1968-1978		1978-1988		1988-1998		1998-2003		1968-2003
		Rank	Total incidents	incidents	*rank*	incidents	*rank*	incidents	*rank*	incidents	*rank*	Groth share of incidents**
UNO	USA	1	1591	774	1	392	1	298	1	127	1	-43,14%
PAL	ISR	2	317	240	2	46	12	25	20	6	19	-91,34%
COL	USA	3	232	13	35	45	13	54	7	120	2	3098,83%
UNO	FRA	4	212	19	21	128	2	60	4	5	22	-8,81%
UNO	ISR	5	192	103	3	51	8	36	10	2	60	-93,27%
UNO	GBR	6	176	32	11	62	5	58	5	24	4	159,91%
PAL	USA	7	175	71	6	38	18	48	9	18	6	-12,14%
PRI	USA	8	142	87	5	55	7					-100,00%
PHL	USA	9	120	13	35	40	16	57	6	10	9	166,57%
UNO	INT	10	119	7	62	23	30	65	3	24	4	1088,14%
TUR	TUR	11	105	17	25	71	3	16	29	1	114	-79,62%
UNO	RUS	12	103	17	25	32	22	52	8	2	60	-59,23%
ARG	USA	13	101	91	4	4	160	5	97	1	114	-96,19%
GRC	USA	14	100	31	12	38	18	22	22	9	10	0,61%
ESP	FRA	15	97	8	56	66	4	21	23	2	60	-13,36%
UNO	ESP	16	90	50	7	26	26	10	45	4	28	-72,28%
KUR	TUR	17	87			10	76	77	2			
GBR	GBR	18	86	23	18	38	18	21	23	4	28	-39,73%
UNO	TUR	19	78	14	32	31	23	31	12	2	60	-50,49%
PER	USA	20	76	6	73	41	14	28	18	1	114	-42,24%
UNO	UNO	21	76	4	96	56	6	16	29			-100,00%
KOR	USA	22	74			41	14	33	11			
TUR	USA	23	73	19	21	19	40	29	15	6	19	9,43%
LBN	USA	24	69	7	62	47	11	13	35	2	60	-0,99%
UNO	ITA	25	69	12	42	24	28	29	15	4	28	15,51%
CUB	USA	26	66	39	9	27	25					-100,00%
UNO	RFA	27	66	40	8	23	30	3	148			-100,00%
IRN	USA	28	64	12	42	38	18	11	39	3	44	-13,36%
RFA	USA	29	60	12	42	48	9					-100,00%
SLV	USA	30	58	2	153	40	16	16	29			-100,00%
CUB	CUB	31	56	36	10	9	87	8	57	3	44	-71,12%
LBN	FRA	32	56	5	81	48	9	3	148			-100,00%
COL	VEN	33	49	1	219	14	50	29	15	5	22	1632,70%
UNO	JPN	34	47			21	36	25	20	1	114	
UNO	PAL	35	46	16	27	22	34	8	57			-100,00%
UNO	YUG	36	46	16	27	22	34	7	69	1	114	-78,34%
GBR	IRL	37	45	30	13	10	76	5	97			-100,00%
USA	RUS	38	45	29	14	16	46					-100,00%
CHL	USA	39	44	2	153	11	68	30	13	1	114	73,27%
ITA	USA	40	44	29	14	10	76	1	317	4	28	-52,20%
PAK	USA	41	44	1	219	7	100	5	97	31	3	10642,75%
IRN	IRN	42	42	3	121	24	28	15	33			-100,00%
UNO	UFN	43	41	25	17	2	261	12	37	2	60	-72,28%
UNO	IRN	44	40	9	52	21	36	10	45			-100,00%
ESP	ESP	45	39	13	35	6	115	20	25			-100,00%
PAL	PAL	46	38	16	27	18	43	4	118			-100,00%
YUG	YUG	47	37	28	16	8	93	1	317			-100,00%
UNO	EGY	48	36	14	32	13	55	9	52			-100,00%
UNO	IND	49	36	14	32	10	76	10	45	2	60	-50,49%
PAL	GBR	50	35	13	35	13	55	7	69	2	60	-46,69%
UNO	CUB	51	35	18	24	13	55	2	199	2	60	-61,50%
UNO	SAU	52	35	1	219	14	50	19	26	1	114	246,54%
UNO	IRQ	53	34	7	62	20	38	6	79	1	114	-50,49%
SOM	USA	54	33					30	13	3	44	
DZA	FRA	55	31			1	372	28	18	2	60	
UNO	NLD	56	31	6	73	13	55	6	79	6	19	246,54%
BOL	USA	57	30	19	21	4	160	7	69			-100,00%
HND	USA	58	30			19	40	11	39			
GTM	USA	59	29	8	56	17	44	4	118			-100,00%
IRN	FRA	60	29			25	27	4	118			
IND	IND	61	28	13	35	12	65	3	148			-100,00%
LBY	LBY	62	28			28	24					
SAU	USA	63	29	1		0		11	39	17	7	5791,18%
UNO	BEL	64	28	5	81	10	76	12	37	1	114	-30,69%
FRA	USA	65	27	15	30	7	100	3	148	2	60	-53,79%

Note: UNO=Unknown origin; INT=International Organizations

**Calculations are based on the relative growth between the share of incidents in the first decade (1968-1978) and that of the last period considered (1998-2003). When the country has not been associated with incidents in first decade, the second decade is taken to compute the related growth rate of incidents.

Table 4: Impact of Terrorism incidents on Log of US imports

Variables	1	2	3	4	5	6	7
Constant	-1.089***	-0.233***	-0.238***	0.165	0.772***	-0.227***	-0.216***
	[0.156]	[0.077]	[0.077]	[0.179]	[0.116]	[0.076]	[0.078]
Log GDP exporter	0.797***	0.805***	0.808***	0.803***	0.815***	0.813***	0.829***
	[0.047]	[0.047]	[0.047]	[0.047]	[0.048]	[0.048]	[0.049]
Log Weighted Distance	-0.465**	-0.472**	-0.454*	-0.485**	-0.498**	-0.489**	-0.523**
	[0.230]	[0.232]	[0.230]	[0.231]	[0.233]	[0.233]	[0.234]
English Common Language	0.380**	0.381**	0.373**	0.389**	0.392**	0.390**	0.437**
	[0.160]	[0.161]	[0.162]	[0.162]	[0.164]	[0.163]	[0.174]
Contiguity	0.994**	0.999***	1.007**	0.950**	0.936**	0.952**	0.850**
	[0.384]	[0.381]	[0.386]	[0.388]	[0.388]	[0.387]	[0.385]
Log GDP per cap	0.02	0.014	0.013	0.015	0.006	0.009	0.002
	[0.063]	[0.064]	[0.064]	[0.063]	[0.064]	[0.064]	[0.064]
Frequency of Incidents originating from ***i*** against ***US:***							
_ in current year	-4.397*						
	[2.616]						
_during last 5 years		-7.316*					
		[4.235]					
Frequency of Incidents originating from ***i*** against ***US*** *(during last 5 years)* **:**							
_ and located in i			-3.764				
			[3.967]				
_ and located in US			-81.545				
			[128.673]				
_ and located in third countries			**-180.106*** **				
			[35.838]				
Frequency of Incidents originating from i				-4.470**			
				[1.863]			
Frequency of Incidents against the US				-5.495***			
				[0.732]			
(1) : Frequency of Incidents originating from ***i*** (during last 5 years)					-6.923**		
					[3.181]		
(2): Frequency of Incidents against the ***US*** (during last 5 years)					-5.938***		
					[0.679]		
(1) * (2): Security proxy						-16.327**	
						[8.211]	
(1) * (2) : Security proxy based on incidents located in ***i***							-7.139
							[7.529]
(1) * (2) Security proxy , based on incidents located in ***third*** countries							**-80.887*** **
							[29.030]
Fixed effects:							
_ product (SITC 5 digits)	yes	yes	yes	yes	yes	yes	yes
_ year	yes	yes	yes	no	no	yes	yes
Number of Observations	699249	673725	673725	700297	673725	673725	673725
R-squared	0.26	0.26	0.26	0.26	0.26	0.26	0.26

Robust Standard errors provided in brackets with clustering by exporter

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Robustness of Terrorism incidents impact on Log of US Imports

Variables	1	2	3	4	5	6	7	8	9	10	11
Constant	-0.216***	-0.292***	-0.232***	-0.216***	-0.228***	-0.309***	-0.315***	-0.218***	-0.236**	_	-1.216***
	[0.078]	[0.081]	[0.089]	[0.078]	[0.081]	[0.084]	[0.083]	[0.079]	[0.093]		[0.078]
Log GDP exporter	0.829***	0.830***	0.823***	0.829***	0.865***	0.831***	0.815***	0.807***	0.803***	2.323***	0.937***
	[0.049]	[0.050]	[0.049]	[0.049]	[0.065]	[0.058]	[0.048]	[0.043]	[0.051]	[0.255]	[0.043]
Log Weighted Distance	-0.523**	-0.536**	-0.497**	-0.521**	-0.591**	-0.464*	-0.543**	-0.527**	-0.462*	_	-0.337*
	[0.234]	[0.236]	[0.234]	[0.238]	[0.289]	[0.252]	[0.238]	[0.222]	[0.243]		[0.204]
English Common Language	0.437**	0.446**	0.412**	0.436**	0.382**	0.375**	0.471***	0.287*	0.208	_	0.410***
	[0.174]	[0.177]	[0.175]	[0.173]	[0.188]	[0.185]	[0.179]	[0.171]	[0.187]		[0.143]
Contiguity	0.850**	0.907**	0.905**	0.853**	0.776*	0.963**	0.976**	0.918***	1.152***	_	0.911***
	[0.385]	[0.418]	[0.369]	[0.391]	[0.436]	[0.413]	[0.392]	[0.337]	[0.384]		[0.301]
Log GDP per cap	0.002	0	-0.031	0.003	0.001	-0.014	-0.023	-0.004	-0.042	-0.689**	-0.067
	[0.064]	[0.067]	[0.078]	[0.065]	[0.072]	[0.079]	[0.068]	[0.057]	[0.088]	[0.312]	[0.075]
(1) * (2) : Security proxy based on incidents located in ***i***	-7.139	-7.369	-6.012	-7.499	-7.259	-7.662	-6.439	-5.157	-6.201	0.208	-0.296
	[7.529]	[7.450]	[7.425]	[8.037]	[7.592]	[7.646]	[7.348]	[6.628]	[6.828]	[2.635]	[8.128]
(1) * (2) Security proxy , based on incidents located in ***third*** countries	***-80.887****	***-78.246****	***-80.294****	***-80.923****	***-83.991****	***-77.529****	***-76.314****	***-56.339****	***-47.709****	***-34.874****	***-110.525****
	[29.030]	***[27.502]***	***[28.576]***	***[29.051]***	***[29.521]***	***[29.306]***	***[27.324]***	***[28.857]***	***[25.570]***	***[13.266]***	***[34.122]***
Bilateral Insecurity											
Military Interstate Dispute											
t		-0.173							-0.175	-0.156	-0.219**
		[0.110]							[0.115]	[0.115]	[0.105]
t-1		-0.153*							-0.169*	-0.142	-0.079
		[0.092]							[0.092]	[0.090]	[0.119]
t-2		-0.089							-0.104*	-0.068	-0.079
		[0.071]							[0.061]	[0.054]	[0.082]
t-3		-0.140*							-0.154**	-0.145**	0.033
		[0.071]							[0.065]	[0.057]	[0.090]
t-4		-0.102*							-0.125**	-0.074	0.219**
		[0.056]							[0.052]	[0.056]	[0.085]
t-5		-0.044							-0.057	-0.102	-0.019
		[0.060]							[0.057]	[0.062]	[0.047]
t-6		-0.035							-0.056	-0.117*	0.114
		[0.074]							[0.070]	[0.070]	[0.074]

Robust Standard errors provided in brackets with clustering by exporter
* significant at 10%; ** significant at 5%; *** significant at 1%

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Table 5 (cont'd): Robustness of Terrorism incidents impact on Log of US Imports

Variables	1	2	3	4	5	6	7	8	9	10	11
t-8		-0.079							-0.077	-0.133*	-0.160**
		[0.078]							[0.073]	[0.072]	[0.068]
t-9		-0.083							-0.123	-0.157***	0.109
		[0.084]							[0.086]	[0.054]	[0.092]
t-10		-0.025							-0.072	-0.139**	0.226
		[0.097]							[0.095]	[0.062]	[0.074]
Same rating of governance than US			0.163						0.095	-0.084	-0.003
			[0.202]						[0.202]	[0.110]	[0.127]
Exporter internal Security											
Civil war in Exporter				0.025					0.061	-0.094	0.144
				[0.181]					[0.186]	[0.066]	[0.216]
Exporter is a newstate					0.061				_	_	_
					[0.134]						
rating of state Governance						0.009			0.009	0.009	_
						[0.016]			[0.015]	[0.008]	
Log of Ethnic fractions in Exporter							-0.101		_	_	_
							[0.071]				
Log of Religion fractions in Exporter								0.235***	0.243***	_	0.179
								[0.074]	[0.074]		[0.112]
Fixed effects:											
_ product (SITC 5 digits)	yes	yes	yes	yes	yes	yes	yes	yes	yes		yes
_ year	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
_ product*exporter										yes	
Observations	673725	673196	673725	673725	656985	659671	672478	673725	659173	659173	249207
R-squared	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.26	0.16	
Log Pseudolikelihood											731073.96

Robust Standard errors provided in brackets with clustering by exporter

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6 : Terrorism and Security Related Effects: Victims, Partner Size, 'Just in Time' and Networks

Variables				Role of Shipping time		Role of Networks		
	Nb. Victims (1)	Nb. Victims (2)	Exporter Size	Non time Sensitive	Time sensitive	Organized Exchange	Referenced Prices	Differentiated Products
Constant	-0.295***	-0.293***	-0.323***	-0.316	-1.041*	1.800***	0.116	-0.576
	[0.080]	[0.080]	[0.085]	[0.353]	[0.623]	[0.682]	[0.396]	[0.628]
Log GDP exporter	0.805***	0.804***	0.809***	0.736***	0.934***	0.276***	0.524***	0.868***
	[0.044]	[0.044]	[0.043]	[0.030]	[0.055]	[0.066]	[0.033]	[0.055]
Log Weighted Distance	-0.529**	-0.530**	-0.508**	-0.447***	-0.625**	-0.322	-0.680***	-0.611**
	[0.221]	[0.220]	[0.218]	[0.153]	[0.270]	[0.224]	[0.133]	[0.285]
English Common Language	0.290*	0.290*	0.265	0.323**	0.363*	0.381	0.281*	0.263
	[0.172]	[0.173]	[0.177]	[0.127]	[0.218]	[0.252]	[0.154]	[0.245]
Contiguity	1.010***	1.017***	1.059***	0.819**	0.956**	1.824**	1.304**	1.249***
	[0.367]	[0.370]	[0.375]	[0.404]	[0.411]	[0.792]	[0.512]	[0.388]
Log GDP per cap	-0.006	-0.005	-0.006	0.033	0.01	-0.202***	-0.028	-0.054
	[0.060]	[0.060]	[0.059]	[0.042]	[0.075]	[0.077]	[0.047]	[0.076]
(1) * (2) Security proxy, based on incidents located in *third* countries	**-46.543***	**-50.140***	**-84.532*****	**-48.863****	**-55.217***	**-50.858**	**-52.697****	**-51.146***
	[25.118]	**[25.573]**	**[30.175]**	**[22.930]**	**[28.940]**	**[32.766]**	**[24.634]**	**[30.659]**
Security proxy* Number of Victims higher than 1 std	-71.298							
	[55.903]							
Security proxy * Number of Victims higher than 5 std		**-166.112****	**-171.595****	**-89.614***	**-235.212****	**-36.754**	**43.36**	**-245.514****
		[77.344]	**[73.851]**	**[51.857]**	**[103.924]**	**[45.437]**	**[53.261]**	**[103.774]**
Security proxy * Partner size			**34.599****					
			[17.454]					
Military interstate dispute:								
t0	-0.161	-0.195*	-0.165	-0.039	-0.332***	0.233	-0.03	-0.340**
	[0.111]	[0.105]	[0.108]	[0.118]	[0.104]	[0.214]	[0.145]	[0.139]
t-1	-0.194**	-0.177*	-0.141	-0.067	-0.226**	0.019	0.098	-0.261**
	[0.087]	[0.091]	[0.095]	[0.102]	[0.092]	[0.169]	[0.117]	[0.112]
t-2	-0.074	-0.103	-0.083	0.018	-0.161**	0.039	0.122	-0.206***
	[0.068]	[0.064]	[0.066]	[0.086]	[0.066]	[0.138]	[0.111]	[0.063]
t-3	-0.157**	-0.151**	-0.141**	-0.027	-0.238***	0.106	0.064	-0.261***
	[0.065]	[0.063]	[0.066]	[0.080]	[0.072]	[0.149]	[0.108]	[0.075]
t-4	-0.102**	-0.121**	-0.090*	-0.035	-0.169***	0.045	0.036	-0.192***
	[0.048]	[0.050]	[0.051]	[0.069]	[0.046]	[0.116]	[0.087]	[0.044]
t-5	-0.043	-0.057	-0.047	0.063	-0.164*	0.051	0.127*	-0.160**
	[0.060]	[0.056]	[0.058]	[0.054]	[0.084]	[0.117]	[0.067]	[0.068]
t-6	-0.069	-0.054	-0.047	0.045	-0.134*	0.11	0.098	-0.138**
	[0.078]	[0.070]	[0.073]	[0.089]	[0.070]	[0.160]	[0.116]	[0.062]
t-7	-0.025	-0.04	-0.023	0.048	-0.116*	0.212	0.082	-0.116*
	[0.064]	[0.057]	[0.060]	[0.062]	[0.061]	[0.137]	[0.099]	[0.064]
t-8	-0.094	-0.103	-0.09	-0.016	-0.209**	-0.018	0.096	-0.175**
	[0.082]	[0.076]	[0.078]	[0.087]	[0.082]	[0.157]	[0.097]	[0.076]
t-9	-0.094	-0.112	-0.104	-0.035	-0.227***	0.022	0.048	-0.178**
	[0.084]	[0.081]	[0.082]	[0.098]	[0.080]	[0.214]	[0.132]	[0.084]
t-10	-0.072	-0.065	-0.065	-0.028	-0.167	0.23	0.117	-0.101
	[0.094]	[0.094]	[0.095]	[0.112]	[0.108]	[0.191]	[0.130]	[0.106]
Log of religion fractions	0.243***	0.242***	0.232***	0.196***	0.274***	0.06	0.197***	0.286***
	[0.075]	[0.075]	[0.075]	[0.065]	[0.087]	[0.095]	[0.071]	[0.092]
Fixed effects:								
_ product (SITC 5 digits)	yes	yes	yes	yes	yes	yes	yes	yes
_ year	yes	yes	yes	yes	yes	yes	yes	yes
Observations	673196	673196	673196	322151	308696	33021	103192	351045
R-squared	0.27	0.27	0.27	0.23	0.35	0.1	0.19	0.3

Robust Standard errors provided in brackets with clustering by exporter
* significant at 10%; ** significant at 5%; *** significant at 1%

Table7: Visas, Networks and US imports

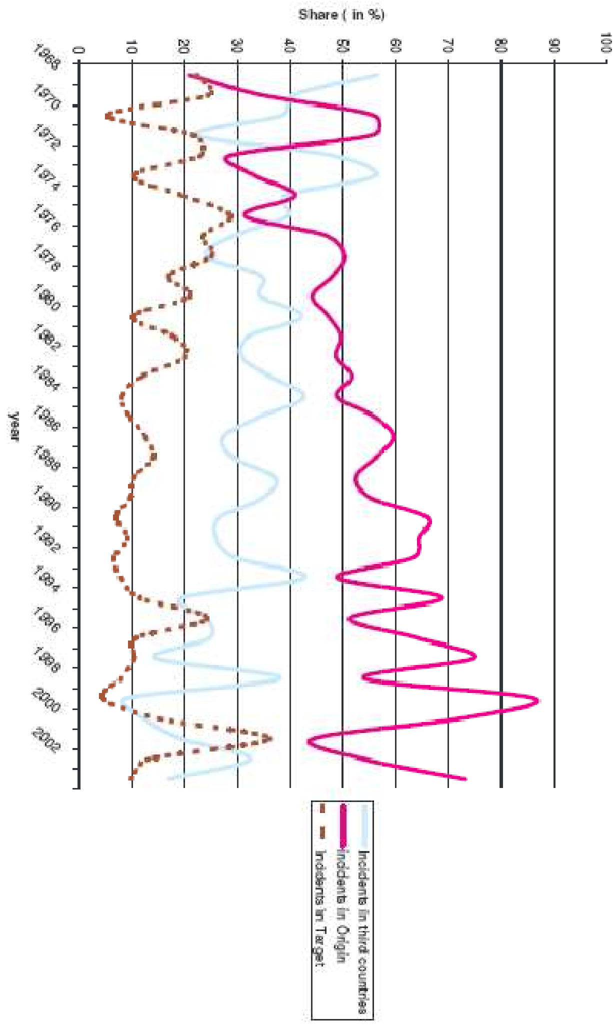
	Model1: Impact of incidents on business visas		Model 2: Impact of incidents and/or visas on trade								
	FE regression	Within regression	FE regression						IV regression (visas instrumented by incidents and other factors)		
			Only visas			Incidents and visas			Incidents and visas		
			Organized Exchange	Referenced Prices	Differentiated Products	Organized Exchange	Referenced Prices	Differentiated Products	Organized Exchange	Referenced Prices	Differentiated Products
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Constant	0.842***	0.057	0.129	-0.245	-0.362	0.134	-0.271*	-0.409	0.260	-0.136	-0.138
	[0.119]	[0.049]	[0.174]	[0.161]	[0.246]	[0.173]	[0.160]	[0.251]	[0.160]	[0.147]	[0.212]
Log GDP exporter	0.807***	0.257	0.649***	0.555***	0.609***	0.680***	0.556***	0.642***			
	[0.0695]	[1.530]	[0.107]	[0.0751]	[0.157]	[0.104]	[0.0740]	[0.152]			
Log Weighted Distance	-1.471***		-0.763**	-0.346	0.556	-0.888***	-0.301	0.559	-0.898***	-0.289	0.518*
	[0.185]		[0.300]	[0.222]	[0.390]	[0.293]	[0.226]	[0.402]	[0.220]	[0.187]	[0.308]
English Common Language	0.925***		0.0866	0.0949	-0.469	0.149	0.115	-0.353	0.225	0.107	-0.220
	[0.149]		[0.293]	[0.223]	[0.345]	[0.291]	[0.223]	[0.338]	[0.299]	[0.211]	[0.310]
contiguity			3.273**	-1.835	7.962	3.116**	-1.806	8.024	2.129	-1.840	7.975*
			[1.454]	[2.591]	[5.165]	[1.413]	[2.607]	[5.140]	[1.462]	[2.738]	[4.503]
Log GDP per cap	0.0700	1.072	-0.169*	0.0193	-0.181	-0.129	0.00145	-0.184			
	[0.0942]	[1.463]	[0.0957]	[0.0839]	[0.145]	[0.0925]	[0.0862]	[0.134]			
(1) * (2) Security proxy, based on incidents located in third countries	**-88.52***	**-76.182*****				**-149.9**	**-39.55**	**-260.1*****	**-172.8***	**-39.55**	**-273.8*****
	[51.09]	**[26.398]**				**[98.22]**	**[57.14]**	**[66.41]**	**[99.04]**	**[54.73]**	**[72.93]**
(1) * (2) Security proxy, based on incidents located in country i	37.59*	9.858				46.71	-30.59	-26.18	58.05	-31.00	-9.275
	[19.32]	[9.234]				[38.07]	[33.88]	[50.85]	[41.75]	[33.43]	[48.95]
Log of number of business visas			**-0.243***	**0.0741**	**0.552*****	**-0.274****	**0.0825**	**0.555*****	**-0.308*****	**0.0906***	**0.493*****
			[0.126]	**[0.0849]**	**[0.139]**	**[0.122]**	**[0.0849]**	**[0.134]**	**[0.0659]**	**[0.0541]**	**[0.140]**
Controls	Military interstate disputes, same governance than US		Military interstate disputes, same governance than US, religion fractions, civil war			Military interstate disputes, same governance than US, religion fractions, civil war			Military interstate disputes, same governance than US, religion fractions, civil war		
Fixed effects:											
_product	yes		yes	yes	yes	yes	yes	yes	yes	yes	yes
_year	yes		yes	yes	yes	yes	yes	yes	yes	yes	yes
_product x exporter		yes									
Hansen Overidentification test									2.47	0.02	1.47
P-value									(0.28)	(0.98)	(0.47)
Period	1997-2002	1997-2002	1997-2002	1997-2002	1997-2002	1997-2002	1997-2002	1997-2002	1997-2002	1997-2002	1997-2002
Observations	98,953	98,954	4,184	13,629	45,027	4,184	13,629	45,027	4,184	13,629	45,027
R-squared	0.759	0.13	0.075	0.115	0.295	0.079	0.116	0.302			

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.10

Included instruments in IV regression: all explanatory variables (including terrorism incidents variables)+GDP, GDP per capita and rating of governance

Figure 1: Location of incidents across Origin, Target and Third Countries



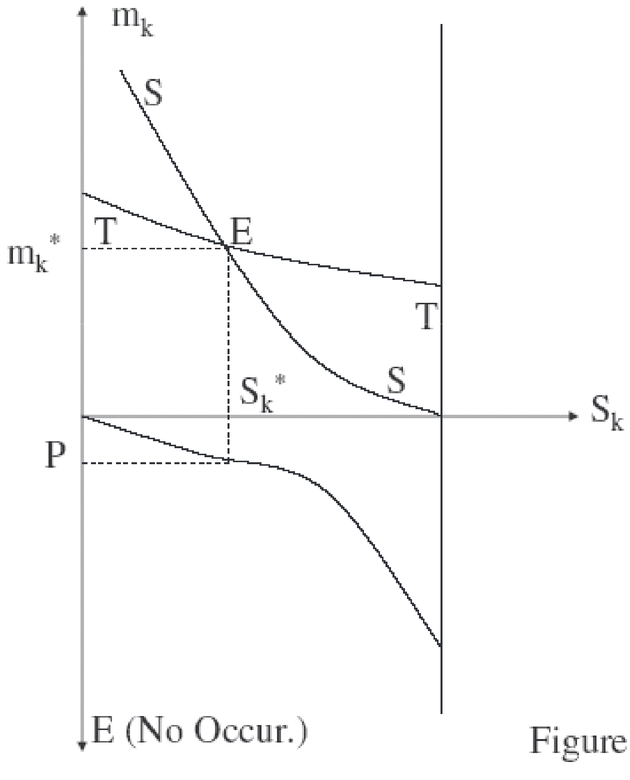


Figure 2

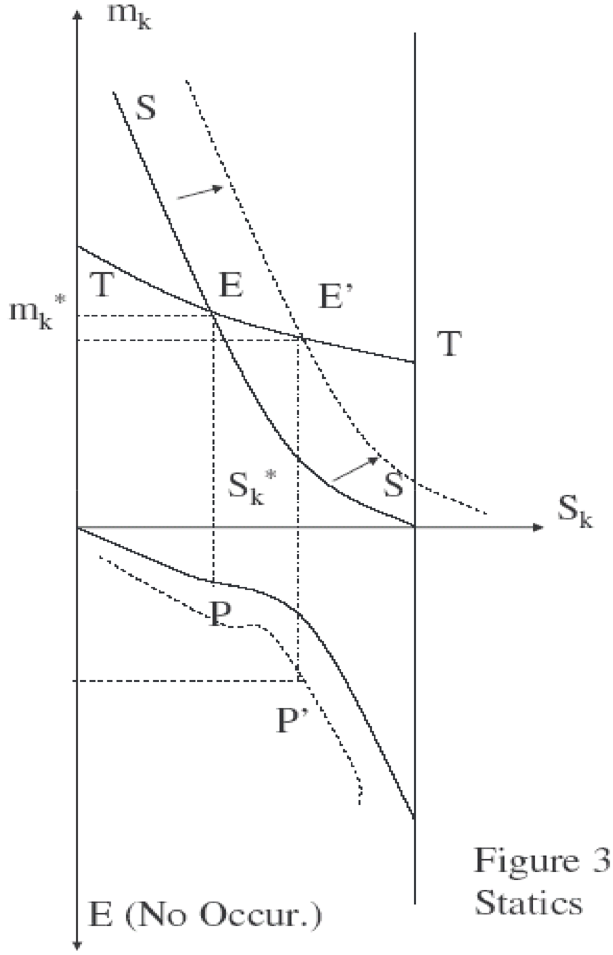


Figure 3): comparative Statics