Intimidated Investors? Host Market and Industry Characteristics Shape FDI's Reaction to Terror

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Abstract

Under what circumstances does terrorism repel foreign investment? The negative effect of terrorism on foreign investment identified in current scholarship masks heterogeneity across host markets and industries. Foreign investment ought to react less to terror when host markets perfectly match firms' needs; when firms lack viable alternative host markets; and when key assets cannot be relocated. We model the endogenous co-determination of terror and investment to derive these comparative statics, highlighting several empirical challenges in identifying the effects of terror on FDI. To overcome these obstacles, we develop an instrumental variable estimator which exploits differences in the networks along which terror and investment spread. Using industry-level data on the activities of US multinationals, we test our model and conclude with implications for the strategic interaction of investors and terror groups.

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Foreign investment in the developing world is repelled by terrorism and other forms of political violence. Terrorism raises the operating costs for multinational firms in areas like security, insurance, and recruitment. It also makes it harder to manage supply chains and ensure predictable day-to-day operations. Despite the growth in terrorist attacks on foreign firms (Enders and Sandler, 2000; Brandt and Sandler, 2010), the literature lacks a systematic account of heterogeneity across industries in their responsiveness to terrorism. Are all industries equally averse to operating in markets with terrorism? If multinationals' strongly negative response to terrorism in foreign host markets is driven by their ability to redeploy investment abroad, then what happens to firms which lack the ability to easily move investments from market to market?

In answer to these questions, we argue that there is significant heterogeneity across industries in their response to terrorism, and that this heterogeneity is driven by the quality of the alternative investment options available to firms. Where options to repurpose investment outside of some host market suffering from terror are good, foreign investment will be highly responsive to terrorism. When the ability to redeploy investment outside of a host market is lacking, multinationals will have to stay put and operate under the suboptimal circumstances – heightened costs, heightened risk – generated by terrorism.

We consider several specific categories of explanations for the ability of firms to repurpose their investments outside of developing markets facing heightened risk of terrorism. First, the inputs employed by firms may be a good match for particular host markets, and those firms may lack other markets that are similarly good matches. Under these circumstances it will be harder to leave if terrorism increases. Second, firms hold license over specific assets in countries – for example, exclusive copyrights, mineral rights, and real estate – that can only be exploited in those countries. These assets are inherently nontransferable across borders. Third, we consider the relative usage of skilled and unskilled labor. Firms employing less skilled workers rely on a crucial endowment in developing host markets which may be hard to abandon; firms employing many skilled workers are likely to do so in their home markets as 'headquarter services'. The latter group can afford to move on when terror raises costs.

In order to test these ideas, we develop a simple formal model of the strategic interaction of multinational firms and terrorists.[1] We formally prove our main contention on the responsiveness of foreign investment to terror and its interaction with outside options. Where marginal returns on investment in a host market increase relative to returns available in the rest of the world, firms are more willing to stay put in the face of terror. This comparative static holds under a variety of assumptions about terrorists' motivations.

Our formal model also points to several empirical challenges in estimating the elasticity of foreign investment with respect to terror. In particular, terror is both endogenous and mutually

[1] The model is inspired by Dragu (2011).

co-determined with foreign investment in a strategic interaction. We resolve these issues by developing an instrumental variable estimator of the elasticity of foreign investment to terror. To construct our instrument, we use the spread of terrorism through religious and cultural networks across the globe, and the fact that foreign investment is plausibly lacking in any religious determinant. Following the critique in Betz, Cook and Hollenbach (2018), we control away two important threats to the exclusion restriction: temporal effects of terrorism in one market which re-distribute investment uniformly, and the geographic spread of terrorism as both religious networks and FDI have a geographic component.

We test our main contentions using data on the intra-firm trade of US multinationals in developing countries, a valuable source of fine-grained industry-level data on the activities of multinational firms that has yet to be examined in this literature. We find that foreign investment is less responsive to terrorism: when an industry's inputs are a good match to a country's output profile, and when leased assets and unskilled labor are important to the industry's production. We examine the robustness of these findings across several types of models, including the use of high-dimensional fixed effects estimators.

Our model and findings make several contributions to the study of FDI and political violence. First, our model has clear implications for which firms are most responsive to terror, and so which countries are most vulnerable – in terms of lost jobs and investment – to terrorism. This heterogeneity across countries has not previously been described. Second, our model and results shed new light on terrorist motivations. We argue and find evidence that terrorists are motivated to run down multinationals' profits – not merely to minimize MNCs in their home countries. Under this assumption, countries with industries that are relatively entrenched will attract more terror. Finally, our model generates new considerations for governments considering how to respond to terrorism, because host states seeking to mitigate the consequences of terrorism need to know which firms are most reactive to terror – and which firms terrorists are likely to target.

The Strategic Interaction of Investors and Terrorists

Multinational corporations face an obsolescing bargain when negotiating with host countries over investment opportunities. Investments require significant sunk costs that are vulnerable to expropriation, transfer risks, and social or political unrest that can disrupt business and increase government incentives to violate contracts (Busse and Hefeker, 2007). One such risk is terrorism and related forms of political violence, which raise costs for enterprises, particularly foreign businesses which may be targets of terror attacks or lack the local know-how to handle security risks at a reasonable cost.

The extant literature identifies four categories of terrorist tactics that inflict costs on foreign in-

vestors. First, some terrorist campaigns directly target the firm's physical assets or personnel due to firm-specific grievances or as an intermediary target to influence government policy and garner media attention (Enders, Sachsida and Sandler, 2014; Brandt and Sandler, 2010). Attacks include the destruction or capture of facilities and murder, extortion, or abduction of employees. These inflict short term costs such as damaged facilities and decreased production and long term costs in the form of increased insurance rates (Jensen, 2008), security expenses (Harvey, 1993), and challenges in recruiting workers both foreign and domestic. Second, the targeting of vital state-owned infrastructure and utilities can hinder day-to-day operations and the transit of goods within and outside of the country. Firms are attracted to host markets in part based on the quality of state-provided public goods–electricity, internet, telecommunication systems, and transportation. Low transportation costs in particular are a primary driver of vertical production networks and instability in these systems should significantly deter investment. Third, attacks against the domestic population, tourists, and public spaces create a hazardous environment for local employees and domestic market activity (Li, 2006; Blomberg, Hess and Orphanides, 2004; Blomberg and Mody, 2005). Firms that require domestic populations to produce or consume their goods are particularly vulnerable to these attacks. Finally, terrorist campaigns broadly contribute to domestic government duress, forcing policymakers to neglect economic investments in favor of greater military spending (Gaibulloev and Sandler, 2009). Instability-induced budget pressures may result in violation of contracts or indirect expropriation of foreign-owned assets.

Scholarship on terrorism and FDI has generally identified a negative relationship between terrorism and foreign direct investment, although this relationship is not uniform across the literature. Abadie and Gardeazabal (2008) find that even modest fluctuations in terror risk cause firms to shift assets to safer locations. Similar findings emerge in country-specific studies on Spain, Greece, and Kenya (Enders and Sandler, 1996; Kinyanjui, 2014). Some studies have found no effect of terrorism on FDI. Li (2006) finds that neither predictable nor unexpected terror attacks are significantly associated with reduced FDI inflows. Witte et al. (2016) likewise finds no significant relationship between terrorism and FDI, arguing that terrorism is too unpredictable to be a significant driver of firms' investment decisions.

In the face of these mixed results, the literature has disaggregated political violence according to its magnitude (Nigh, 1985; Braithwaite and Kucik, 2014; Li, 2006; Enders, Sachsida and Sandler, 2006) and target selection (Bandyopadhyay, Sandler and Younas, 2014, 2018; Eldor and Melnick, 2004; Powers and Choi, 2012; Enders, Sachsida and Sandler, 2006). Transnational attacks–involving perpetrators, targets, or victims from more than one country– have been used to measure the most direct risks to foreign corporations (Bandyopadhyay, Sandler and Younas, 2014). Powers and Choi (2012) find only attacks on business targets to be associated with reduced inflow of FDI, but not attacks on non-business targets. In an analysis on Israel's financial markets, Eldor and Melnick (2004) find that investors in Israeli financial markets are most sensitive to suicide attacks which

tend to produce large numbers of casualties. Some studies find the impact of terrorist violence to be particularly acute for developing countries (Blomberg, Hess and Orphanides, 2004; Sandler and Enders, 2008; Gaibulloev and Sandler, 2009) but may be moderated by investors ability to anticipate violence ex ante (Li, 2006) and by robust counter-terrorism capabilities (Bandyopadhyay, Sandler and Younas, 2014; Lee, 2017)

Despite attempts to resolve the disparate results in the literature by disaggregating violence, only a few studies have examined heterogeneity across firms and industries in sensitivity to political violence. Studying political instability broadly, Burger, Ianchovichina and Rijkers (2015) show that non-resource tradable sectors are the most sensitive to political shocks in the Middle East and North Africa. Dai, Eden and Beamish (2017) examines the multifarious effects of war, highlighting the different barriers to exit firms face based on their proximity to fighting, assets and portfolio diversity, and resilience. Witte et al. (2016) analyze firm heterogeneity in response to multiple forms of violence, and demonstrate the impact of war, but find no significant effect of terrorism on resource-related, non-resource related, or aggregate greenfield FDI inflows. Some work has identified particular sectors that are more vulnerable to terrorist violence (such as tourism (Enders and Sandler, 1991; Drakos and Kutan, 2003; Sloboda, 2003), passenger air travel (Merari, 1998; Ito and Lee, 2005) and energy (Toft, Duero and Bieliauskas, 2010)). This is also suggested by recent work from Bandyopadhyay, Sandler and Younas (2018) showing a larger impact of terrorism on trade in manufactured goods compared to primary commodities. Surveying the literature, there is a need for a more systematic account of what firm and industry features facilitate or inhibit a rapid response to violence.

We also highlight that just as MNC's adjust their investment levels to account for violence, the presence of a foreign firm may influence a terror groups' strategies. The activities of foreign firms can create grievances within communities opposed to the presence or practices of foreign investors. For example, the Movement for the Emancipation of the Niger Delta (MEND) formed specifically to oppose the exploitation of oil reserves in the Niger Delta region of Nigeria and have launched numerous attacks against MNCs, including Royal Dutch Shell, Exxon Mobile, and Chevron.[2] Foreign companies may also be attractive targets for terrorist groups seeking to maximize the publicity or economic impact of their attacks. Most simply, as the number of foreign firms increases, it becomes easier for groups to conduct transnational attacks. Alternatively, foreign direct investment that bolsters economic growth and prosperity may reduce the motive for political conflict (Barbieri and Reuveny, 2005) and so may indirectly reduce terrorist violence (Li and Schaub, 2004).[3] Above

[2] Data on the group's attacks can be found on the Global Terrorism Database at https://www.start.umd.edu/gtd/search/Results.aspx?perpetrator=20301

[3] Some previous work has treated violence as exogenous (Li, 2006; Enders, Sachsida and Sandler, 2006) while other work has used an IV GMM approach to account for endogeneity (Blomberg, Hess and Orphanides, 2004; Bandyopadhyay, Sandler and Younas, 2014; Dai, Eden and Beamish, 2017).

all, this work highlights that firms undertaking foreign investment and terror groups considering targeting those firms are in a strategic interaction. Their endogenous choices must be considered at the same time and with due regard for one another's motivations.

A final thread which runs through our analysis concerns the motivations of terrorists *vis-a-vis* multinational firms. Most theories of target selection assume groups perpetrate attacks that maximize the political or social benefits for the lowest cost (Sandler, Tschirhart and Cauley, 1983; Kydd and Walter, 2006; Rapoport, 2013; Abrahms, 2012). They use terrorism and choice of target to signals the group's capacity, ideology, or reliability to potential adherents, rival groups, and governments (Schmid and de Graaf, 1982; Kydd and Walter, 2006). Most groups depend on some support from local civilians (financial, intelligence, recruitment) and they choose targets with this audience in mind. In our formal treatment, we find that a disparate range of motives can be fruitfully classified into two broad aims: to either minimize foreign firms' *profits* or foreign firms' *presence*.

Terrorist groups that seek to minimize foreign firm presence may be motivated to attack international businesses because they represent an extension of the firm's home government. Attacks against these businesses are proxy attacks on a foreign enemy, and signal the group's capabilities to sympathetic populations or provoke a counterterrorism overreaction (Crenshaw, 1981; DeNardo, 1985; Kydd and Walter, 2006; Bueno de Mesquita and Dickson, 2007). Foreign multinationals may also represent the host government's economic policies. Many terrorist groups, particularly those with leftist ideologies, rally support from rural communities and workers that feel marginalized by the government's domestic policies (Robison, Crenshaw and Jenkins, 2006). Terrorist groups might retaliate against non-state actors (such as businesses) when these organizations interfere with the domestic security environment (Murdie and Stapley, 2014). International businesses can also undermine a terrorist group's narrative of grievance by providing jobs to local civilians, engaging in corporate social responsibility, demonstrating host state competence, and altering assumptions about the multinational's home state.

Alternatively, terrorist groups may choose to target and inflict costs on foreign multinationals but not eradicate their presence entirely. Attacks designed to minimize multinationals' profits might be seen as a way to maximize attention from both MNCs, home governments, and the media (Crenshaw, 1981; Nossek, 2004). Those messages might be most amplified when they sharply reduce MNC's profits. MNCs serve as a conduit to a wider audience – especially host and home governments – for the group to broadcast grievances, attract adherents, and solicit donations from abroad (Kelly and Mitchell, 1981). Firms may also contribute to the host government's ability to counter terrorists through revenue from taxation or direct financial support.[4] The strategy is twofold, groups can reduce firm profits (and by extension, their ability to engage in activities costly to the group) and elevate international awareness of the group and their grievances. We treat these

[4] For example, in 1996 British Petroleum Exploration began subsidizing the Colombian Defense Ministry's budget in exchange for added protection of assets (Schemo, 1996).

strategies as an effort to minimize multinational profits. Finally, we also highlight that terrorists' motivations might be entirely unrelated to the presence or profits of multinationals, and yet their activities may still generate incidental costs for multinationals.

Model set-up, assumptions, and equilibrium

Our model begins with a multinational firm (or firms) denoted F considering how much to invest $i \geq 0$ in a host country H. Assuming that there is no terrorism, the profit that the firm earns from investing in H is represented by $\pi^H(i)$. This function is increasing in i when i is close to zero, but investment has decreasing marginal returns everywhere. This firm confronts two issues as it seeks to determine it's level of investment. The first is that there is a terror group T whose terrorist activities a increase the costs of investment. The literature has examined many such costs associated with terrorist activity including security costs (Harvey, 1993); changes in government policies and budget allocations (Li, 2006; Blomberg, Hess and Orphanides, 2004; Blomberg and Mody, 2005); insurance premiums (Jensen, 2008); increased trade costs (Nitsch and Schumacher, 2004); recruitment costs; and disruptions to supply chains and the movement of workers. We represent these terrorism-induced expenses by introducing an additional cost associated with the level of investment that is an increasing function of terrorist activities. These additional costs are given by $c^F(a)i$. The function $c^F(a)$ increases in a, so the marginal cost of every unit of investment is increasing in the quantity of terrorism.[5]

The second issue the firm confronts in making its investment decision is that it has an outside option to repurpose underperforming investment in the host market. We refer to this outside option as the 'rest of the World', and denote profits earned there with the function $\pi^W(i)$. This function is (at least initially) decreasing in i, because more investment in H naturally leads to less investment in the rest of the world; it also has decreasing marginal returns.[6] Much of our analysis will end up focusing on the relative attractiveness of investment in the host market compared to the rest of the world. We instantiate this relative appeal in a parameter η which is a coefficient on $\pi^H(i)$. When η is great, the appeal of investing in H relative to W is high; when η is low, W is relatively more attractive.

All of these pieces comprise the objective function for the multinational firm:

$$U^F(i,a) = \eta\pi^H(i) - c^F(a)i + \pi^W(i).$$

[5] We also assume that $c^F(a)$ has a negative second derivative, which is a stability requirement for finding an interior solution. In other words, this says that terrorism has decreasing marginal returns in terms of imposing costs on multinational corporations.

[6] The online appendix provides our complete assumptions on the derivatives of $\pi^H(i)$ and $\pi^W(i)$. We assume that there is a third option available for investable funds which earns zero profits, so in equilibrium firms will invest such that $\pi_i^H \geq 0$ and $\pi^W(i) \leq 0$

Table 1: Main variables in the model.

Variable description	Symbol	Comment
Exogenous variables:		
Relative appeal of host market	η	A feature of the multinationals' objective function that when higher leads to greater marginal returns to investment in the host market relative to other available markets in the world. Ceteris paribus increases investment in the host market.
Terrorists' cost-shifter	γ	A feature of the terrorists' objective function that when higher makes the costs of undertaking terrorism greater. Ceteris paribus decreases terrorism in the host market.
Endogenous variables:		
Level of investment	i	The amount of investment that the multinational chooses to place in the host market. Investment in the rest of the world is declining in i.
Level of terrorist activities	a	The amount of terrorism undertaken by the terror group.
Elasticity of investment to terror	$\epsilon_{i,a,\gamma}$	This represents the percentage change in investment when terrorism decreases by 1% due to increased costs of undertaking terrorist activities. Expected to be negative.

The multinational's objective is to choose a level of investment i to maximize the profits represented in this equation. Of course, this decision will be made in anticipation of the level of terror activities a undertaken by the terrorist group T.

We assume that the terror group is motivated (at least in part) to minimize the profits earned by the multinational in the home market. This motivation might arise from a desire to attract attention from the multinational, its home government, and the host government; or, to minimize the tax revenues gathered by the host government.[7] We also assume that terrorist activities have costs (likelihood of reprisal or capture, loss of other opportunities) that increase in the amount of terror undertaken. These costs are represented by the function $c^T(a)$ which is increasing in a and also has a positive second derivative, so these costs accelerate. Under these assumptions, the

[7] Terrorist are of course likely to be motivated to attack other targets, which might incidentally raise multinationals costs or not. Incorporating this extra motivation, for example through a general utility associated with activities $u^T(a)$, would not substantively alter our main propositions.

terrorist's objective function is

$$U^T(a,i) = \eta\pi^H(i) - c^F(a)i + \gamma c^T(a)$$

and the terrorist's goal is to choose a level of activities which *minimizes* this objective function. Note the parameter γ which pre-multiplies the costs of terror activities: we use this to model exogenous shocks to the ability of terror groups to undertake terror activity.

Our assumption that terrorists seek to minimize the *profits* in the host market of the multinational gives terrorists a motive to keep i relatively high even as $c^F(a)$ is pushed up, too. That might be plausible if terrorists are primarily attention-seeking, but is not consistent with a motive of simply minimizing foreign influences (including foreign investment). We therefore also check that our main results hold under several alternative formulations: terrorists seek to minimize foreign investment i; terrorists seek to maximize a; and terrorists seek to maximize $c^F(a)$. The analysis of these three cases turns out to be very similar, in that all lead terrorists to pursue a fixed amount of activities a^* that is unaffected by equilibrium investment or the parameter η. The terrorists want to generate as much activity as possible subject to the costs generated by their activities. We therefore refer to these cases collectively as a motivation to minimize multinationals' *presence*.

We imagine that the multinational firm and the terrorists make their choices about investment and activities simultaneously and with complete information about one another's means and motives. We assume an interior solution for both i and a, and then identify a Nash equilibrium in pure strategies. Our assumptions about the second derivatives described above ensure that the first order conditions for the firm's and terrorist's problem implicitly define the optimal i and a chosen in equilibrium.

The responsiveness of foreign investment to terror

How does foreign investment respond to terror? In our model, both investment and terror are endogenous choices of strategically interacting agents, so to answer this question we focus on an exogenous shock to the ability of terrorists to undertake terrorism. This occurs through a change in γ, which makes terrorism costlier to the terrorists. Using this shock, we define an elasticity of investment with respect to terror which is the percentage change in investment divided by the percentage change in terror when terrorism becomes more costly. We notate this elasticity as $\epsilon_{i,a,\gamma}$. This elasticity is the focus of the remainder of our theoretical and empirical analysis. We prove in the online appendix that this elasticity is negative in sign: if terrorism were to get costlier then equilibrium terror decreases and equilibrium investment increases.

What factors will tend to mitigate or exacerbate the responsiveness of investment to terrorism? We focus on the ability of the firm to take its investment out of the host market H and to profit from it in the rest of the world W. The ability to do this is driven by the parameter η in the model, and

we expect that when outside options are very good (η is low) that investment reduces dramatically in the face of increased terror. When outside options on the world market are less appealing (η is high), then we expect investment to stick around, even in the face of growing terrorism. Before we present the main result, we provide an assumption which plays the role of a sufficient condition in our main proposition:

Assumption 1. *Either* $\epsilon_{i,a,\eta} \geq 1$ *or* $2c^F_{aa} > -c^F_a/a$.

We can now present our main result.

Proposition 1. *Given Assumption 1, foreign investment declines less in the face of increased terrorism when multinationals' alternative investments are less appealing, and foreign investment declines more when outside options are more appealing. Symbolically,* $\frac{\partial \epsilon_{i,a,\gamma}}{\partial \eta} > 0$ *under Assumption 1, and otherwise may be positive or negative.*

The two possible sufficient conditions contained in Assumption 1 are sufficient but not necessary for investment to be less responsive to outside terror when outside options are bad: there are several terms in the formal statement of $\frac{\partial \epsilon_{i,a,\gamma}}{\partial \eta}$ which are positive with certainty, and so may ensure that the overall derivative is positive in the absence of Assumption 1. The first part of Assumption 1 has a satisfying substantive interpretation: $\epsilon_{i,a,\eta} \geq 1$ implies that investment ought to be more responsive to shocks to η than is terrorism. Since η has a first-order effect on investment but only affects terrorism to the extent that it increases investment, that seems to be a plausible assumption. Alternatively, we can assume that $2c^F_{aa} > -c^F_a/a$, which is an assumption that the marginal increase in costs imposed on the firm from terrorism need to tail off sufficiently quickly as terrorism grows.[8]

Will this main comparative static hold when the terror group is assumed to be minimizing foreign investment rather than minimizing the multinational's profits?

Proposition 2. *If the terror group's aim is to minimize multinationals' presence, then* $\frac{\partial \epsilon_{i,a,\gamma}}{\partial \eta} > 0$ *without further assumption.*

The sufficient conditions given in Assumption 1 are no longer required for our main proposition to hold, and thus our main claim about the responsiveness of foreign investment to terror is robust to alternative assumptions about terrorist motivations.[9]

[8] We investigate these sufficient conditions further in the appendix, by examining parametric forms for the cost functions. For example, if we assume that $c^F(a)$ and $c^T(a)$ are monomials of the form $c^F(a) = \rho^F a^{\theta^F}$ and $c^T(a) = \rho^T a^{\theta^T}$ that satisfy our assumptions above, then the first part of Assumption 1 is satisfied so long as $\theta^T - \theta^F > 1$ and for any $\theta^T > 2$. Alternatively, we can show that the second half of Assumption 1 will hold if $\theta^F \leq .5$. We thus have a variety of sufficient but not necessary conditions which cover a wide range of the parameter space, and ensure that the main comparative static in Proposition 1 will hold.

[9] In Appendix A we present an extension of the model which incorporates a government G which can engage in anti-terror activities g. To make this addition analytically interesting, we assume that firms' costs are a decreasing function of anti-terrorism $c^F(a, g)$ where $c^F_g < 0$. We show that our main results carry through in their entirety as long as $|c^F_{ag}|$ isn't too large.

Translating the model into testable propositions

We test these propositions by developing measures of γ, an exogenous shock to the amount of terrorism, and η, which is the relative appeal of a given host market as a location for investment in comparison to the rest of the world economy. We defer the discussion of γ for where we introduce the instrumental variable, and focus for now on η. For η, we base our expectations on the basic determinants of the appeal of a market for offshore production. Firms locate their facilities where they can easily exploit resources used intensively in their supply chain. To unpack this general statement we consider: the resource match for any industry with a particular host country compared to alternative host markets; the use of leased assets and real estate which are nontransferable across borders; and the skill-level of workers.

A host country is a good fit for a firm if it has a relative abundance of the inputs used intensively in that firm's production. A good match could represent endowments in a relatively scarce resource, or availability to fulfill a diverse set of input requirements. Of course, a host country is chosen based on the inputs it is capable of supplying in comparison to all other available host countries. To account for a firm's ability to invest elsewhere, we consider the match between a firms' input needs in all other available markets outside of the current host market. If the match between the firms' input needs and the host is high compared to the rest of the world, η will be high too, and firms will have to stay put even as terrorism raises their costs.

Leased assets–such as real estate, exclusive use rights, intellectual property– represent largely nontransferable, country-specific contracts. For example, a company might own the exclusive mineral rights for a particular oil field in some country; or, a company might hold a trademark worldwide on some product that they wish to exploit by producing and selling in some market. The former example represents an ideal case for a high η, because there could be no value associated with transferring the oil rights to an alternative host market (although of course there would be value in transferring movable assets like drilling equipment or management to markets where other leases are held) (Pantzalis, 2001). Leased assets therefore represent, at least in part, sunk costs. Abundant investment in leased assets also demonstrates a firm's experience navigating the legal and political bureaucracy in a given country. To enter a new market, firms whose profits rely on leased assets must expend additional resources cultivating relationships with business and government officials and competing for scarce contracts. We expect these intangible and costly assets to increase a firm's resistance to fleeing violence.

Finally, we consider the relative level of skilled and unskilled labor employed in the industry. Industries that intensively employ unskilled labor outsource production to take advantage of markets with a relative abundance of unskilled labor (Yeaple, 2003). Firms also consider country-specific labor standards that may raise the attractiveness of one source relative to others. Firms that rely more heavily on skilled labor are unlikely to be sourcing their labor from developing coun-

tries. Instead, these firms usually employ skilled labor in the home country through a strategy of 'headquarter services', and source other aspects of production overseas. Holding all other characteristics constant, we expect greater reliance on skilled labor to lower the barriers to firm exit, resulting in a lower η value, while greater reliance on unskilled labor ought to raise η.

Data and Empirical Strategy

Data

Our outcome variable is the related party exports to the US of multinational corporations located in developing countries.[10] We have trade data for 138 US trade partners. These data are available for 2002-2016 only, defining the time frame for our study, and we examine industries at the level of the 4-digit NAICS code. There are 109 such goods-producing industries.[11] Related-party exports from some country to the US cross a border but stay within the hands of a single firm. They may include the exports of US-based multinationals producing in a host market for sale in the US; the exports of host market multinationals to their foreign affiliates in the US; or the exports of MNCs from a third country with affiliates in both the host market and the US. We refer to these related-party exports as $\textit{Intra-firm exports}_{nit}$ where n refers to a 4-digit NAICS industry; i to a particular developing market host country; and t to the year.

Intra-firm exports are not the same thing as stocks or flows of foreign direct investment by US MNCs. First, they are a measure of exported production and not investment. As such, they have been used to measure the scale of vertical foreign investment (where the motive is to produce abroad for sale back home) rather than of horizontal foreign investment (where the motive is to produce abroad to sell abroad). Second, related-party exports to the US may include the sales of host market firms, which are not the subject of this study. This generates error in our outcome measure, however this error is likely to be low, because most developing countries have little or no FDI in the United States. The use of related-party exports to proxy for level of foreign investment has several distinct advantages. First, the data is at an extremely fine-grained level – much more than is available for stocks of FDI. Second, production is likely to be more responsive to terror than investment, making it easier to identify the effects of sudden increases in terror. Third, intra-firm exports do not suffer from the issues associated with FDI data identified in the literature, in

[10] Our list of developing countries includes all countries that fall outside of the World Bank's "High income" category in 2012.

[11] Disaggregated trade data is not recorded for services. The US Census Bureau provides data on related party exports by industries at the 6-digit NAICS level, although we aggregate these up to the 4-digit level. Data is available at https://relatedparty.ftd.census.gov/. As defined in Section 402(e) of the Tariff Act of 1930, related party trade includes transactions with various types of relationships including 'any person directly or indirectly, owning, controlling or holding power to vote, 6 percent of the outstanding voting stock, or shares of any organization (US Census Bureau).

particular, that financial flows and the strategic reallocation of mobile (often financial or intangible) assets to offshore tax havens are often included in FDI measures.

Our explanatory variables are measures of terrorist attacks in the host country. The Global Terrorism Database provides incident-level data on terrorist attacks and their attributes (GTD, 2018).[12] The main explanatory variable, *Terror count*, represents the number of terror attacks in the host country in a given year. All attacks within the host country are included regardless of the perpetrator's nationality (i.e. domestic and transnational). This measure encompasses all the categories of terrorist attacks that inflict costs on foreign firms. We also isolate the most direct tactic for minimizing the profits of multinationals; attacks against domestic and foreign firms. *Bus. terror count*$_{i,t}$ is a count of all GTD terrorist attacks against a business target in country i for year t and *Foreign Bus. terror count*$_{i,t}$ is the subset of these attacks that target foreign firms.[13]

Our theoretical model suggests that the effects of terror on multinational activity are conditional on industry features. To measure these, we first construct a variable called *Input match*$_{nit}$, which measures the fit between a given industry's input profile and the ability of a host market to produce those inputs. To measure an industry's input requirements, we use the vector of input shares for a 4-digit US industry created using benchmark Input-Output tables from the Bureau of Economic Administration.[14] To measure a country's ability to supply inputs, we use the vector of all exports to the US at the 4-digit NAICS industry (normalized to sum to one). The *Input match*$_{nit}$ variable is defined as the cosine similarity between the two vectors, and equals 1 if the two vectors exactly align and 0 if the two vectors share no overlap.

We use the *Input match*$_{nit}$ variable to construct a measure of firms' ability to move production to a viable alternative market. To construct this, we weight all other inputs matches in other potential host markets by their GDP and geographic distance from the current market. Markets that are larger and nearer are likely to provide more appealing alternatives. The measure is therefore

$$\text{Input alternatives}_{nit} = \frac{\sum_{j \in I \setminus i} \text{Input match}_{nit} \cdot g_{ij} \cdot ln\ \text{GDP}_{jt}}{\sum_{j \in I \setminus i} g_{ij} \cdot ln\ \text{GDP}_{jt}}.$$

Here we use $j \in I \setminus i$ to index all countries but i; g_{ij} is the inverse geographic distance between

[12] Intentional violent incidents perpetrated by non-state actors are included in the dataset if they fulfill two of the following three criteria: 1) "The act must be aimed at attaining a political, economic, religious, or social goal." 2) "There must be evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) than the immediate victims." 3) "The action must be outside the context of legitimate warfare activities." Descriptions and further information available from the GTD Codebook at http://www.start.umd.edu/gtd/downloads/Codebook.pdf.

[13] The GTD includes several levels of target classification. We included all attacks where the primary target type (targtype1) is classified as a business. If the GTD target nationality variable (natlty1) does not match the host country, we classify the target as foreign.

[14] We set the diagonals of the input-output table to zero so that own-industry value-added is excluded. Tables available at https://www.bea.gov/industry/input-output-accounts-data

Table 2: Face validity of input match measures

	Intra-firm exports			
	1	2	3	4
Input match	4.973	4.973	4.879	4.982
	(0.042)	(0.042)	(0.042)	(0.041)
Input alternatives	−1.160	−1.160	−1.078	−1.489
	(0.042)	(0.042)	(0.044)	(0.056)
Intercept	0.484	0.484	−0.544	1.181
	(0.053)	(0.053)	(0.063)	(0.077)
N	211140	211140	211140	211140
Country FE	No	Yes	Yes	Yes
2 Digit Ind. FE	No	No	Yes	Yes
3 Digit Ind. FE	No	No	No	Yes
Year FE	Yes	Yes	Yes	Yes

countries i and j; and GDP_{jt} is country j's nominal GDP at time t.[15] We examine the face validity of these variables in Table 2. The table fits an OLS model of logged *Intra-firm exports* regressed on *Input match* and *Input alternatives*. We expect that *Intra-firm exports* will be positively correlated with *Input match* and negatively correlated with *Input alternatives*, which is what we see.

We also measure the percentage of inputs that come from leased assets (including land and mineral rights, but also non-financial intangible assets like intellectual property) and the percentage of input costs that arise from the purchase or rental of real estate.[16] The former measure connects our examination to the long-running literature on intangible assets and corporate mobility. These variables are called $Leased\ assets_n$ and $Real\ estate_n$, respectively.

To create estimates for the percentage of skilled and unskilled labor employed in each sector we use Occupational Employment Statistics (OES) data from US Bureau of Labor Statistics.[17] The OES data contain sector-level estimates for the number of employees in each occupation type. We match this data with the International Standard Classification of Occupations (ISCO-08) and classify all occupations with ISCO-08 skill levels of 3 or 4 as skilled labor (ILO, 2012). We aggregate the number of employees in skilled and unskilled positions to create a ratio for each sector and multiply this by the sector's percentage of labor inputs from the Bureau of Economic Analysis input-output tables. These variables are called $Skilled\ labor_n$ and $Unskilled\ labor_n$.

One final point: the distributions of some of the six proxies for η described above are highly skewed. To deal with this, we use the rank order (normalized to fall between 0 and 1) for each of

[15] Our data on geographic distances comes from CEPII GeoDist database (Mayer and Zignago, 2011). This data provides the distance between every country pair using the great circle formula based on the latitudes and longtitudes of the most populous cities in each country.

[16] In the 2002 benchmark input-output tables, leased assets are measured as lessors of nonfinancial intangible assets (NAICS 5330) and real estate (NAICS 5310). Labor inputs are based on average percent expenditures on employee compensation.

[17] OES data available from the US Bureau of Labor Statistics at https://www.bls.gov/oes

these variables rather than the raw variable measures themselves.

Empirical strategy

Our formal analysis points to a focus on the elasticity of foreign investment to terrorism. Specifically, we would like to know if an exogenous shock to terrorist operations which increases terrorism will tend to push down foreign investment. This relationship is represented symbolically by $\epsilon_{i,a,\gamma}$, and this elasticity – as well as its variation across industries with different features – is our primary quantity of interest.

Our focus on elasticity suggests that we need to regress the logged amount of intra-firm exports on the logged count of terror attacks. This log-log set-up generates an estimate of the elasticity given by the coefficient on the terror count variable. However, our model makes clear that a simple regression of this sort will generate a highly misleading estimate of $\epsilon_{i,a,\gamma}$. This is so for several reasons. First, terror is endogenous and so any estimate of the links between terrorism and foreign investment is prone to serious confounding. For example, within the model an increase in η (the appeal of foreign investment in the host market) leads to an increase in both foreign investment and terrorism, as the terror group seeks to drive down investors' profits or drive away heightened investment. Thus, the attractiveness of the host market is a confounder that might suggest a spurious positive effect of terror on FDI.[18] Second, and relatedly, the model highlights that investment and terrorism are simultaneously determined, so any random positive shock to investment is likely to increase terror. This further confounds our estimate of the elasticity.

These considerations lead us to employ an instrumental variable estimator for the elasticity of investment to terror. We employ a two-stage regression model. Our instrument plays the role of the γ parameter in our formal analysis, which must be some factor in a host country which makes terrorism in that country more likely but which is not likely to have any affect on foreign investment in that country (other than via the increase in expected terrorism). We argue that an instrument is available which *conditionally* satisfies this exclusion restriction.

This instrument for the number of terror attacks in country i at time t (i.e. *Terror count*$_{it}$), is the weighted average of terror attacks in all other countries in the rest of the world in the same year.[19] We use as weights the cosine similarity of the distribution of religions in a country. For example, two countries i and j which are both 50% Catholic and 50% Protestant are maximally similar (and so $w_{ij} = 1$) while a third country k that is entirely Theravedan Buddhists is totally dissimilar (and so $w_{ik} = w_{jk} = 0$). A country l that is 50% Catholic and 50% Orthodox Christian would have a weight of $w_{il} = .25$ with country i.[20] Note that these weights are equal to the probability that two

[18] Note that within the model $\epsilon_{i,a,\eta} > 0$ while our quantity of interest is $\epsilon_{i,a,\gamma} < 0$.

[19] Our data on terror attacks comes from the Global Terrorism Database (www.start.umd.edu/gtd/) and contains both domestic and transnational terrorist attacks.

[20] Our information on the distribution of religions across countries come from the World Religion Database

randomly selected inhabitants in each country share the same religion. Our instrumental variable for *Terror count*$_{it}$ then is the religion-weighted terrorism of all other countries in the world:

$$\text{Rel. wtd. terror}_{it} = \frac{\sum_{j \in I \setminus i} w_{ij} \text{Terror count}_{jt}}{\sum_{j \in I \setminus i} w_{ij}}.$$

We use the same instrumental variable when *Bus. terror count*$_{it}$ is the main independent variable.

One core assumption behind this instrument is that terror may propagate across national boundaries along religious lines or along other cultural lines that are correlated with religion. Terror committed by or against members of a religious group in one country is likely to raise the probability of terror committed by or against the same group in other countries. Of course, this inclusion requirement is testable in the first stage of our two-stage procedure, and we show below that it holds. The exclusion restriction requires that religion-weighted terror of other countries not have any effect on foreign investment in country i except through its impact on terrorism in country i. We think that is plausible in general because we do not expect foreign investment – particularly the vertical foreign investment on which we concentrate – to have any religious dimension to it whatsoever. For example, it is implausible that greater terrorism in countries with a high percentage of Catholics will lead firms to re-invest in other Catholic countries *because they are Catholic*.

That being said, there are two plausible challenges to our exclusion restriction. First, greater terrorism in one country is likely to lead to more investment in all other countries, creating a link between our instrument and the outcome via simple diffusion. For this reason, we employ year fixed effects in all specifications. Second, religions are geographically concentrated, and the multinational operations of firms may be too. These correlations would lead to an unwanted correlation between our instrumental variable and our outcome that does not operate via terrorism in country i as our exclusion restriction requires. For this reason, we include in all specifications a control for terrorism in all countries weighted by their inverse geographic distance. Defining g_{ij} as the inverse of the shortest distance between the most populous cities of countries i and j, this variable is

$$\text{Geo. wtd. terror}_{it} = \frac{\sum_{j \in I \setminus i} g_{ij} \text{Terror count}_{jt}}{\sum_{j \in I \setminus i} g_{ij}}.$$

Controlling for Geo. wtd. terror$_{it}$ will eliminate the unwanted links between Rel. wtd. terror$_{it}$ and our main outcome variable.[21] Thus, we argue that the exclusion restriction is conditionally satisfied by partialing out year fixed effects from the outcome variable and by removing the local geographic

available at www.worldreligiondatabase.org/. This data provides the percentages of the population that identify with one of 28 major religions and traditions. The Database provides updated percentages every five or ten years and we used estimates from 2010.

[21] This geographic distance data also comes from the CEPII GeoDist database (Mayer and Zignago, 2011) available at www.cepii.fr/CEPII/

component of the spread of terror from the instrumental variable. The correlation between the instrument and outcome which remains is likely to be mediated by terror in the host country, only.

Before introducing our estimating equations, we make one final note. Any estimation of the effect of terror on FDI is likely to be plagued by observable and unobservable country-specific effects. Most obviously, larger countries might attract more FDI and terror, but it could also be that more unequal or more developed countries attract both of each, too. For this reason, we include country fixed effects (or higher dimensional fixed effects) in virtually all of our models.

When we conduct our initial country-centered analysis, the unit of analysis is the country-year it. The first stage equation for our instrumental variables regression is therefore:

$$\text{Terror count}_{it} = \alpha_0 + \alpha_1 \cdot \text{Rel. wtd. terror}_{it} + \alpha_2 \cdot \text{Geo. wtd. terror}_{it} + \mu_t + \mu_i + \epsilon_{it}$$

and the second stage equation is

$$\text{Intra-firm exports}_{it} = \beta_0 + \beta_1 \cdot \widehat{\text{Terror count}}_{it} + \beta_2 \cdot \text{Geo. wtd. terror}_{it} + \mu_t + \mu_i + \epsilon_{it}$$

The letters μ_t and μ_i refer to the year and country fixed effects that we include in all specifications, and $\beta_1 = \epsilon_{i,a,\gamma}$ is our main quantity of interest.

When we investigate how the elasticity of foreign investment to terror is conditioned by structural features of the industry (and the host market), the unit of analysis is the 4-digit NAICS industry-country-year (nit). The first stage equation in this case is analogous to the first stage given above, and the second stage equation is given by

$$\text{Intra-firm exports}_{nit} = \beta_0 + \beta_{1-13} \cdot \mathbf{X}_{nit} + \beta_{14} \cdot \text{Geo. wtd. terror}_{it} + \mu_t + \mu_i + \epsilon_{nit}$$

where

$$\mathbf{X}_{nit} = \widehat{\text{Terror count}}_{it} * \Big(\text{Input similarity}_{ni} + \text{Lack of alternatives}_{ni} + \text{Real estate}_n + \text{Leased assets}_n + \text{Unskilled labor}_n + \text{Skilled labor}_n\Big).$$

Note that $\mathbf{X}_{nit}$ includes the complete set of interactions and lower order terms. We assume that the industry or country-industry features we examine above – like the input similarity and usage of unskilled labor) are exogenous. Introducing more inter-industry variation within countries opens up a rich set of possibilities for further fixed effects. We first consider industry fixed effects at the 2 and 3-digit NAICS level, and then subsequently we consider country-3-digit and county-4-digit fixed effects, to provide control for unchanging features of US patterns of investment in developing countries at a very fine-grained level.

Table 3: Terror reduces exports of US MNCs from developing countries

	Terror count	Intra-firm exports		Placebo
	1	2	3	4
Rel. wtd. terror	0.871			
	(0.177)			
Terror count		−1.194	−2.441	−0.165
		(0.613)	(2.647)	(0.433)
Geo. wtd. terror	0.327	0.384	0.321	−0.404
	(0.185)	(0.524)	(1.116)	(0.315)
ln GDP pc			1.047	
			(1.022)	
GDP growth			0.065	
			(0.822)	
ln Population			3.526	
			(2.664)	
BIT with US			−0.770	
			(2.305)	
Polyarchy			0.123	
			(1.374)	
ln Civil con bd			0.721	
			(0.844)	
Intercept	4.393	22.007	−36.803	17.456
	(0.329)	(3.253)	(40.761)	(2.344)
N	1620	1620	1596	1620
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Results

Country-level results on FDI and terror

We begin our empirical analysis by examining a key finding in the literature, that terrorism repels foreign direct investment. We conduct this as a basic check of our dependent variable and our empirical strategy, as well as to anticipate our detailed investigation of heterogeneity in terror's effect on FDI. The results of this analysis are presented in Table A2. Our first-stage equation is presented in the first column, and shows that *Rel. wtd. terror* has a positive affect on *Terror count*, as is necessary to be a valid instrument. We also note that this positive relationship holds even partialing out geographically proximate terror attacks, as measured by *Geo. wtd. terror*. As expected, *Geo. wtd. terror* is also positively associated with *Terror count*.

Turning to our main quantity of interest, the second stage estimate of the elasticity of FDI to terror is represented by the coefficient on *Terror count* in columns 2 and 3. We expected this estimate to be negative (though it averages across heterogeneity in industries) and we find exactly that. Our estimate is that a 1% increase in the *Terror count* is predicted to reduce *Intra-firm exports* by about 1.2%. This negative effect of terror on foreign investment is somewhat higher when additional controls are included. Our findings at the country-level therefore correspond with the findings in

the literature that terror has an on average negative effect on foreign investment.

We justify our use of intra-firm exports as a dependent variable by exploring the effect of terrorism on exports by ordinary domestic firms in the host country. This placebo test is in column 4. We find that terror has a very small and statistically insignificant impact on the exports of domestic firms. Since a typical local firm, particularly in the developing countries we examine, has less or no ability to offshore production, the much smaller impact of terror on exports is unsurprising. Domestic firms are relatively stuck in their home markets, suggesting that we ought to look at foreign firms that are similarly unable to repurpose their investments in the face of terror in host markets.

Heterogeneity in response to terror across industries

We now consider heterogeneity across industries in their responsiveness to increased terror. We examine separately our three types of explanations for the ability of firms to redeploy investments overseas: input match with current and alternative host markets; reliance on real estate and leased assets; and the relative use of labor endowments in host markets and at home. We structure our presentation in this way so that we can discuss our results for each main class of explanation (and its robustness to alternative model specifications and measures) all at once.

Our primary focus is on the estimates from the models in Table 4. In the table, we use semicolons to refer to interactions between two variables. For example, the row labeled 'Terror count' refers to the coefficient on the lower-order term for the *Terror count* variable, while the row labeled ': Input match' is the coefficient for the interaction between *Terror count* and *Input match*. We suppress all other lower order terms to preserve space. We first examine models with a bare minimum of interaction terms (columns 1-3), because the six variables when interacted with *Terror count* tend to be highly correlated. We also check the robustness of our main findings to two types of industry fixed effects and other controls in models 5-7, and then subsequently discuss robustness with high dimensional country-industry fixed effects; lagged dependent variables; and reduced form estimates which are presented in the appendix. Most importantly, we provide in the main text (as Table 5) a replication of all of our main results using *Bus. terror count* instead of *Terror count* as our main independent variable.

In order to translate our results into interpretable quantities of interest, we provide estimated changes in the elasticity of foreign investment to terror in Table 6. For these first differences, all explanatory variables are held at their median in the data and one variable is changed at a time.[22] For example, the first row shows the change in the estimated elasticity of investment to terror when *Input match* is moved from its 50th to its 75th percentile, while holding all other variables constant.

[22] The estimated coefficients from model 4 of Table 4 are employed for all simulations. Uncertainty in the coefficient is incorporated into the confidence intervals by drawing coefficients from an (assumed multivariate normal) sampling distribution.

Table 4: MNCs exports are less responsive to terror when outside options are weaker

	Model						
	1	2	3	4	5	6	7
First stage: DV Terror count:							
Rel. wtd. terror			0.871		0.871	0.871	0.470
			(0.018)		(0.018)	(0.018)	(0.014)
Geo. wtd. terror			0.327		0.327	0.327	0.219
			(0.018)		(0.018)	(0.018)	(0.015)
Second stage: DV Intra-firm trade:							
Terror count	−0.031	−0.187	−0.144	−0.355	−0.476	−0.448	−0.355
	(0.090)	(0.088)	(0.084)	(0.101)	(0.100)	(0.098)	(0.159)
: Input match	0.291			0.436	0.434	0.393	0.303
	(0.062)			(0.063)	(0.063)	(0.062)	(0.065)
: Input alternatives	−0.344			−0.239	−0.026	−0.039	−0.036
	(0.024)			(0.025)	(0.026)	(0.029)	(0.030)
: Real estate		0.000		−0.036	−0.054	−0.053	−0.034
		(0.054)		(0.056)	(0.056)	(0.054)	(0.056)
: Leased assets		0.256		0.366	0.337	0.342	0.339
		(0.058)		(0.066)	(0.066)	(0.064)	(0.066)
: Unskilled labor			0.259	0.196	0.257	0.248	0.250
			(0.061)	(0.061)	(0.060)	(0.060)	(0.062)
: Skilled labor			−0.088	−0.133	−0.118	−0.116	−0.083
			(0.058)	(0.063)	(0.062)	(0.062)	(0.064)
Geo. wtd. terror	−0.067	−0.082	−0.082	−0.061	−0.061	−0.063	0.066
	(0.087)	(0.087)	(0.086)	(0.086)	(0.086)	(0.084)	(0.089)
ln GDP pc							−0.008
							(0.059)
GDP growth							0.001
							(0.091)
ln Population							−1.580
							(0.219)
BIT with US							0.001
							(0.144)
Polyarchy							−0.045
							(0.149)
ln Civil con bd							−0.025
							(0.045)
Intercept	−0.473	−0.485	−0.485	−0.468	−1.237	0.552	0.391
	(0.047)	(0.047)	(0.047)	(0.047)	(0.064)	(0.085)	(0.105)
N	165240	165240	165240	165240	165240	165240	162792
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2 Digit Ind. FE	No	No	No	No	Yes	Yes	Yes
3 Digit Ind. FE	No	No	No	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

A confidence interval for each first difference is provided in the final column. Note that with all variables held at their median the estimated elasticity of investment to terror (of any kind) is −0.48; the elasticity of investment to terror attacks targeting businesses is −0.60.

Input match in the host market and alternative markets Model 1 shows that firms whose input demands are a better match to the host markets in which they are invested are more resistant to leaving those markets. This is shown by the positive and significant coefficient on the *Input match* interaction

term. The estimated effect of *Input match* on responsiveness to terror is quite large, as seen in Table 6. Increasing *Input match* from its median value to the 75th percentile in the data reduces the elasticity of investment to terrorism from −0.48 to −0.40. We see similar results, qualitatively and quantitatively, when examining the effects of terror attacks targeting businesses specifically. These core results are also consistent across the robustness checks, including 2- and 3-digit industry fixed effects in models 5-6; additional controls in model 7; and 3- and 4-digit industry-country fixed effects provided in the online appendix. We also see the same pattern in reduced form linear models without instrumental variables. Evidently American businesses are reticent to leave the markets whose inputs are most tailored to their economic needs even in the face of heightened security risks.

Models 1 and 4 also show the predicted negative coefficient on the interaction term between *Terror count* and *Input alternatives*. This negative coefficient means that industries which have more alternative markets that provide a good match to their needed inputs are more responsive to terror attacks. Looking at the first differences in Table 6, the predicted effect of an increase in *Input alternatives* from its 50th to its 75th quantile on the elasticity of investment is about −.06 for all terror attacks and −.09 for attacks targeting businesses specifically. However, this finding is not entirely robust across model specifications. It is diminished in size and significance by the introduction of industry fixed effects, for example, and varies substantially across the models with country-industry fixed effects. Thus, the claim that available alternative markets drive responsiveness to terror likely merits more investigation, but is not consistently supported in this data.

Use of immobile assets In our theoretical discussion, we predicted that the heavy use of relatively immobile assets would lead to reduced responsiveness of foreign investment to terror. For this reason, we expected that industries that rely heavily on real estate and the leasing of intangible assets – whether intellectual property, franchise agreements, or leasing rights – ought to be more willing to stick around when increasing terrorism raises the costs of doing business. Our main results in Table 4 do not support the claim that the use of real estate leads to less responsiveness to terror (or more, for that matter). On the other hand, our results in Table 5, where we examine terror attacks on businesses specifically, do align with our expectations. Some of the subsequent models with higher-dimensional industry-country fixed effects are supportive of the hypothesis, too, so overall we see a somewhat mixed picture with some support for our claim that the extensive use of real estate may create unwillingness to leave host markets where terrorism has increased.

In contrast to the findings on real estate, we see a consistent and highly robust pattern that the use of leased assets is associated with a significantly reduced willingness to retreat in the face of terror. An increase in the use of leased assets from a median value to its 75th percentile is predicted to dramatically reduce the elasticity of investment to terrorism from −0.48 to −0.39. For terrorism targeting businesses specifically, the corresponding change is from −0.60 to −0.39. This relation-

Table 5: Replication of Table 4 using terror attacks on businesses only (*Bus. terror attacks*).

	Model						
	1	2	3	4	5	6	7
First stage: DV Business terror count:							
Rel. wtd. terror			0.257		0.257	0.257	0.129
			(0.016)		(0.016)	(0.016)	(0.015)
Geo. wtd. terror			0.340		0.340	0.340	0.397
			(0.016)		(0.016)	(0.016)	(0.016)
Second stage: DV Intra-firm trade:							
Bus. terror count	0.040	−0.438	−0.041	−0.690	−0.914	−0.860	−1.752
	(0.366)	(0.376)	(0.372)	(0.378)	(0.374)	(0.364)	(1.908)
: Input match	0.216			0.703	0.667	0.640	0.492
	(0.151)			(0.153)	(0.153)	(0.148)	(0.165)
: Input alternatives	−0.670			−0.370	0.049	−0.046	−0.040
	(0.059)			(0.061)	(0.063)	(0.070)	(0.073)
: Real estate		0.255		0.278	0.243	0.242	0.298
		(0.138)		(0.143)	(0.142)	(0.137)	(0.145)
: Leased assets		0.233		0.820	0.763	0.791	0.785
		(0.148)		(0.169)	(0.168)	(0.163)	(0.171)
: Unskilled labor			0.429	0.272	0.387	0.354	0.375
			(0.156)	(0.156)	(0.153)	(0.151)	(0.159)
: Skilled labor			−0.731	−0.738	−0.711	−0.684	−0.566
			(0.145)	(0.158)	(0.157)	(0.156)	(0.165)
Geo. wtd. terror	−0.061	−0.056	−0.056	−0.066	−0.064	−0.064	0.521
	(0.186)	(0.186)	(0.185)	(0.183)	(0.182)	(0.178)	(0.663)
ln GDP pc							−0.092
							(0.082)
GDP growth							0.254
							(0.458)
ln Population							−1.824
							(0.593)
BIT with US							−0.748
							(1.264)
Polyarchy							0.083
							(0.427)
ln Civil con bd							0.115
							(0.256)
Intercept	−0.591	−0.595	−0.595	−0.589	−1.810	0.253	−0.106
	(0.101)	(0.101)	(0.100)	(0.099)	(0.114)	(0.132)	(0.274)
N	108630	108630	108630	108630	108630	108630	107712
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2 Digit Ind. FE	No	No	No	No	Yes	Yes	Yes
3 Digit Ind. FE	No	No	No	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

ship is robust to industry fixed effects and country-industry fixed effects, and is very similar in reduced form specifications and models with a lagged dependent variable. We therefore conclude that American firms are more likely to stand pat when the threat of terror grows in host markets if they are highly reliant on the use of leased assets. This finding sheds light on the relationship between oil and terrorism, as the oil industry is the most reliant on the leasing of intangible assets (in this case, mineral rights) according to US input-output tables.

Table 6: Simulated elasticity of foreign investment across scenarios

	Variable held at:		
Variable	50th %-tile	75th %-tile	95% CI for difference
Estimated elasticities of foreign investment to all terror:			
Input match	-0.47	−0.40	(0.05,0.10)
Input alternatives	" "	−0.54	(−0.07,−0.05)
Real estate	" "	−0.49	(−0.04,0.02)
Leased assets	" "	−0.38	(0.06,0.12)
Unskilled labor	" "	−0.42	(0.02,0.08)
Skilled labor	" "	−0.51	(−0.06,−0.00)
Estimated elasticities of foreign investment to terror targeting businesses:			
Input match	-0.60	−0.49	(0.06,0.16)
Input alternatives	" "	−0.69	(−0.12,−0.06)
Real estate	" "	−0.53	(0.00,0.14)
Leased assets	" "	−0.39	(0.12,0.28)
Unskilled labor	" "	−0.53	(−0.01,0.14)
Skilled labor	" "	−0.78	(−0.26,−0.11)

Types of labor used Our final claim is that firms which intensively employ unskilled labor will be less likely to leave the developing markets in which they are invested, because unskilled labor is an important locational asset in those markets. In contrast, firms that employ more skilled labor – which is likely to take the form of headquarter services located in the US or in 3rd markets – should be more flexible in their locational decisions, and so more able to move when terror increases. The results presented in Table 4 are consistent with these predictions. A substantial increase in the usage of unskilled labor is predicted to decrease responsiveness to terror sharply, from −0.47 to −0.42. In contrast, a large increase in the use of skilled labor is predicted to increase responsiveness to terror, pushing it up to −0.51. We see similar results when examining terror attacks on businesses in the bottom half of Table 6. We find that this result on unskilled labor is quite robust in the alternative models we examine in the appendix. In contrast, we find that the relationship between skilled labor and responsiveness to terror is not entirely robust, so the evidence for this latter pattern is somewhat weaker.

Summary of results Surveying our results, we find that three of our hypothesized factors are strongly associated with a diminished responsiveness of US multinationals to terrorism in host countries. These are: the match of the multinational's input requirements to the host country's production profile; the use of intangible leased assets like intellectual property and mining rights; and the use of unskilled labor (an endowment which is a typical driver of vertical foreign investment in developing countries). The evidence is more mixed on three other factors which were hypothesized to increase responsiveness to terror. These are the availability of a good input match in large and geographically proximate markets; the use of real estate as an input; and the use of skilled labor.

Terror Strategy and the Mobility of Foreign Investments

If features of firms' industries and their host markets affect their response to terrorism in those markets, how is terrorist strategy affected in turn? Recall that we showed in our first two propositions that the absolute elasticity of investment to terrorism is decreasing in the desirability of the host market relative to alternative markets in the rest of the world. This main conclusion holds regardless of whether the terror group is assumed to desire to minimize foreign multinationals' *profits* or to minimize foreign multinationals' *presence*. However, the underlying motive for terrorism does affect the question we now address: If a host market is very attractive to foreign multinationals relative to the world market, will terrorists respond to the unwillingness of firms' to leave the host market by engaging in more or less terror? More broadly, how do the activities of terror groups respond to the underlying economic structure faced by foreign multinationals?

The answer to questions of terrorist motive are given in a third proposition which is proved in the appendix.

Proposition 3. *If the terror group's aim is to minimize foreign profits then terrorism is increasing in the relative attractiveness of the host market relative to the world market, that is,* $\frac{\partial a}{\partial \eta} > 0$. *If the terror group aims to minimize foreign investment as a whole, then* $\frac{\partial a}{\partial \eta} = 0$.

Terrorism is increasing in the relative attractiveness of the host market when terrorists' seek to run down multinationals' profits for two reasons. First, there is more foreign investment to serve as a tempting target, whether direct or indirect, for the terrorist group. Second, the marginal benefit of terrorism stays higher because multinationals are more likely to sit tight even in the face of enhanced terrorism because their outside options are poor. This gives terrorists more opportunities to successfully depress multinationals' profits, and demonstrate their prominence to governments both domestic and foreign. In contrast, when terrorists seek to minimize the total quantity of foreign investment, terrorism is not affected by the relative attractiveness of the host market. This is so because the strategic calculus for the terror group is unchanged by an increased quantity of foreign investment: they still wish to push their terror activities as high as possible subject to their budget constraint.[23]

In order to investigate whether the structure of the economy – and its attractiveness to foreign multinationals relative to the rest of the world – can influence terrorism, we conduct a new empirical exercise. We do this both to examine which assumption about terrorist motives might hold, but more broadly to shed light on how the nature of the economy and its position in world markets can influence the strategy of terror groups.

[23] Note that we might also construct a model where the marginal benefits of terrorism are decreasing in the total quantity of foreign investment in a country, perhaps because terrorists value pushing out foreign investment more as they get closer to eliminating it completely. In this case, it is likely that terror activities would be decreasing in η although corner solutions are likely to obtain.

To begin, we first construct a summary measure of the extent to which a country's economy is characterized by investments that are hard to repurpose in foreign markets. Building on our discussion and findings above, this measure is given by:

$$\begin{aligned}\text{Immobility}_{it} \equiv\ & \text{Input match}_{it} - \text{Input alternatives}_{it} + \text{Real estate}_{it} + \\ & \text{Leased assets}_{it} + \text{Unskilled labor}_{it} - \text{Skilled labor}_{it}\end{aligned}$$

Each of the components of this index is defined as the weighted average of the variable defined above across all industries' exports in a particular country. As an example,

$$\text{Input match}_{it} = \frac{\sum_n \text{Input match}_{nit} \cdot \text{Exports}_{nit}}{\sum_n \text{Exports}_{nit}}.$$

Note also that each of the components of the Immobility_{it} index falls on the unit interval. In order to normalize the index and ease interpretation, we add two to the index and then divide by six, so the index itself falls on the unit interval. (Note that in practice, countries vary only from about .19 to .69.) The top five countries in terms of average *Immobility* over the years 2002-2016 are Angola, Nigeria, Pakistan, Bangladesh and El Salvador.

Having constructed this index, we then fit variations of the following simple model:

$$\text{Terror count}_{it} = \beta_0 + \beta_1 \cdot \text{Immobility}_{it} + \beta_2 \cdot \text{Geo. wtd. terror}_{it} + \beta_3 \cdot \text{Rel. wtd. terror}_{it} + X_{it} + \mu_t + \epsilon_{it}.$$

X_{it} refers to a set of country-level controls, including GDP per capita and a measure of democratization. We examine several outcome variables in addition to the total count of terror attacks, including the total number of terror attacks on businesses and the total number of attacks on foreign businesses. We also examine the proportions of all terror attacks that are launched against businesses and foreign businesses. The results from these models are presented in Table 7.

Across all of our dependent variables we see a distinct pattern: countries that rank as having endowments that make it hard for foreign multinationals to leave in the face of terrorism tend to attract more terrorism. For example, the fitted model in column 1 suggests that moving *Immobility* from its median to its 75th percentile is predicted to increase the number of terror attacks by nearly 16%. Similarly, an increase in immobility is predicted to increase attacks on businesses and foreign businesses specifically by 9% and 3%. We check the robustness of this finding by examining each of the six components of the *Immobility* index separately in the online appendix, and we find very similar patterns where greater immobility is associated with more terror.

These results are consistent with the assumption that terrorists are motivated, at least in part, by a desire to drive down the profits of multinational corporations. As a consequence, terror groups may find terrorism more beneficial where multinational enterprises are relatively stuck, and unable to redeploy their investments to other markets. Such corporations are then 'sitting ducks' in com-

Table 7: Countries with more immobile investments have more terror

	All terror	Business terror		Foreign bus. terror	
	Count	Count	Proportion	Count	Proportion
	1	2	3	4	4
Immobility	2.669	1.525	0.487	0.568	0.281
	(0.492)	(0.277)	(0.123)	(0.099)	(0.061)
Geo. wtd. terror	0.688	0.377	0.099	0.053	0.005
	(0.141)	(0.079)	(0.033)	(0.028)	(0.016)
Rel. wtd. terror	1.065	0.459	0.009	0.130	0.024
	(0.116)	(0.065)	(0.027)	(0.023)	(0.013)
Intercept	−1.607	−1.437	−0.365	−0.351	−0.151
	(0.443)	(0.250)	(0.107)	(0.089)	(0.053)
N	1791	1791	864	1791	864
Year FE	Yes	Yes	Yes	Yes	Yes

parison with more mobile firms that can rapidly redeploy investments when terrorism increases.

This finding then sheds light on the sorts of economic environments that are likely to attract more terrorism, especially terrorism targeting foreign multinationals. In some countries, terrorists motivated to drive down corporate profits will be thwarted by resource endowments which are easily found in alternative markets, and an industrial mix that does not rely on leased assets or unskilled labor. In markets with highly specific and hard to replicate assets however, terror groups will find tempting targets in the form of multinationals that have to stand by and bear the burdens of terrorist violence. Thus multinationals may then act as a conduit for terrorists' demands to be heard by the local host government, home country governments, and the international community.

Conclusion

Since the 1960s, firms have increasingly relied on vertical production networks to exploit resource endowments and production advantages across multiple countries. To capitalize on these opportunities, firms cede the autonomy and security provided in their home country for the protections promised by host governments. They weigh the risks associated with operating in an unfamiliar environment against the benefits of access to cheap inputs. One of these risks is the physical destruction and political instability caused by terrorist attacks. As governments have focused their finite resources on protecting state facilities, businesses have become relatively easier alternative targets (Enders and Sandler, 2000; Brandt and Sandler, 2010). International firms are particularly vulnerable as they may represent a symbolic target (for example attacking a McDonalds to express anti-United States sentiment) or access to wider media networks, and have little local security knowledge. Currently, the literature lacks a clear explanation for why some firms continue to operate in these environments of heightened risk while others exit the market entirely.

This article addresses the gap in the literature by explaining heterogeneity across industries in their responsiveness to terrorist attacks. Our formal model shows that firms are more resilient when host markets are a relatively good match compared to alternative markets in the world economy. To test these expectations empirically, we develop an instrumental variable, overcoming the challenges of endogeneity and co-determination highlighted in the model. We argue that mobility is determined by the firm's input fit with the host country relative to outside options, the use of leased assets and real estate, and reliance on skilled verse unskilled labor. The firm's responsiveness to terrorism is constrained by the opportunity cost of relocating. Our results largely support our theory of the elasticity of investment to terrorist risk. Firms are less responsive to terrorism when their inputs are a good match to the host country, production relies on exclusive licenses over assets, and they employ relatively higher levels of unskilled labor. Our results also show that terrorists are motivated in part by a desire to minimize these firms' profits. Terrorists increase their violence in environments that are less conducive to firm exit.

These results also highlight policy options for host countries facing terrorist violence. Governments have a finite set of resources to allocate toward counterterrorism. When government and military targets are prioritized by governments and become more difficult to target, businesses can provide a less risky alternative for terrorists. Our results show that policymakers seeking to minimize firm exit should might wish to focus their efforts on firms with more opportunities to profit in the world economy, although we leave formal examination of this for future research. Firms that are relatively stuck in the market appear doubly insecure: these firms are an attractive target for terrorist groups seeking to minimize foreign profits, and governments may prioritize security for firms with a higher flight risk. When firms consider relocating production abroad they must adjust their risk assessments to take into account the possibility of becoming trapped–unable to relocate in environments of heightened violence and neglected by state security.

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SUPPORTING INFORMATION

The following additional materials are available in the online appendices:
Appendix A: Formal model.
Appendix B: Additional Models.

FOR ONLINE PUBLICATION ONLY

Appendix A:

Model set-up

The model begins with a multinational firm (or firms) F which choose a level of investment $i \in [0, \infty)$ in a host market H which may be subject to some terrorist activities $a \in [0, \infty)$ by a terrorist group T. Investment by the multinational and the terror group occur simultaneously but with complete information.

The term $\eta\pi^H(i) - c^F(a)i$ represents the firm's profits from the level of investment $i \geq 0$ in the host market. The function $\pi^H(i)$ is all profit associated with the investment excluding costs associated terrorism. We assume that profit from investment facing diminishing returns $\pi^H_{ii} < 0$ and that these diminishing returns accelerate (or at least do not decelerate) as more investment is added $\pi^H_{iii} \leq 0$. The term $-c^F(a)i$ represents the cost encountered by the firm when terrorism occurs; these costs are assumed to scale linearly with the quantity of investment. $c^F(a)$ is a cost-shifter associated with terrorist group activities a such that $c^F_a > 0$ and $c^F_{aa} < 0$. We also assumed that $c^F(0) = 0$. The term $\pi^W(i)$ represents the firm's profits in the rest of the world outside of the host market. We again assuming diminishing returns to investment outside of the host market, which implies that $r^W_{ii} < 0$. One important point about the functions $\pi^H(i)$ and $\pi^W(i)$ is that we always assume that there is a third option available to a firm with its investment, which is to simply leave investible funds on the sidelines and earn no profits. For this reason, we can assume that $\pi^H(i) \geq 0$ and $\pi^W(i) \leq 0$ at any optimum. The firm is not being forced to make investment in either the host market or the world market that lead to losses at the margin. Finally, to reduce exposition in the main text we also make an assumption that $\pi^W_{iii} \leq 0$. This is not without consequence as will be seen below, so the reader should be advised that $\pi^W_{iii} \leq 0$ plays the role of a sufficient (but hardly necessary) condition in the main comparative static derived in our first proposition. Adding all of this up, the multinational's objective function is:

$$U^F(i, a) = \eta\pi^H(i) + \pi^W(i) - c^F(a)i$$

and it's problem is

$$\max_i U^F(i, a).$$

We initially assume that the terror group seeks to minimize the host market profits of the multinational firm. The terror group therefore is aiming to minimize $\eta\pi^H(i) - c^F(a)i$. This is not an uncontroversial decision: note, for example, that it would create a motive for the terror group to keep investment in the host market high while at the same time increasing terror activities to generate exorbitant costs. However, we think this assumption is consistent several potential motives, including seeking attention the attention of multinationals (and their home governments) by minimizing their profits; and seeking the attention of host governments by minimizing their tax revenues. Because this assumption is contestable, we later rederive our main comparative static and show that it holds (and in fact, holds more generally) under the assumption that terrorists are seeking to minimize foreign investment i. A desire to minimize i would be consistent with several plausible motives, including minimizing foreign influence and seeking attention by minimizing the number of jobs provided by foreign investment.

We imagine that terror activities incur a cost $\gamma c^T(a)$ where γ is a cost shifting parameter and $c^T(a)$ is an increasing function of a with increasing marginal costs: $c^T_a > 0$ and $c^T_{aa} > 0$. The terror groups utility function is therefore:

$$U^T(a, i) = \eta\pi^H(i) - c^F(a)i + \gamma c^T(a)$$

and it's problem is

$$\min_a U^T(a,i).$$

Equilibrium

We now find implicit best response functions for the firm and the terrorist. For the firm, the optimal i^* assuming an interior solution is given implicitly by the first order condition

$$\eta\pi_i^H(i^*) + \pi_i^W(i^*) - c^F(a) = 0.$$

The second order condition for this to be a maximum is $\eta\pi_{ii}^H + \pi_{ii}^W < 0$, which will hold given our concavity assumptions about the profit functions. A sufficient and necessary condition for the existence of an interior solution is $\eta\pi_i^H(0) + \pi_i^W(0) - c^F(a) > 0 \rightarrow \eta\pi_i^H(0) - c^F(a) > -\pi_i^W(0)$: the marginal profit gained through an initial investment in H must exceed the marginal revenue lost by reducing investment in W. Note also that given any positive level of terror activity, $\pi_i^H(i^*) > 0$ and will not equal zero in equilibrium.

For the terrorist, the optimal a assuming an interior solution is given implicitly by the first order condition

$$-c_a^F(a^*)i + \gamma c_a^T(a^*) = 0$$

and the second order condition for this to be a minimum is $-c_{aa}^F i + \gamma c_{aa}^T$. Under our assumptions from above, the second order condition is always positive so the first order condition, if satisfied, implicitly defines the cost- and profit-minimizing level of terror activities. A sufficient and necessary condition for an interior solution is that $-c_a^F(0)i + \gamma c_a^T(0) < 0 \rightarrow c_a^F(0)i > \gamma c_a^T(0)$ – that the extra costs added to the firm by the initial increase in terror activities not be exceeded by the cost to the terror group of those activities.

Assuming the conditions hold for an interior solution for both i^* and a^*, the strategy profile (i^*, a^*) defined implicitly by the systems of equations

$$\{\eta\pi_i^H(i^*) + \pi_i^W(i^*) - c^F(a^*) = 0 \quad -c_a^F(a^*)i^* + \gamma c_a^T(a^*) = 0\}$$

is a Nash equilibrium in pure strategies for the game between the firm and the terrorist group. We focus on this equilibrium for the comparative statics analysis and do not investigate the existence of mixed strategy Nash equilibria or corner solutions. We suppress * notation henceforth to minimize clutter, but all actions are assumed to be in equilibrium.

Comparative statics

Shocks to terrorism and the elasticity of investment to terror We begin the comparative statics analysis with examination of the elasticity of foreign investment to terror, using a shock to the costs of terror activities to drive a change in equilibrium outcomes. In particular, we imagine that the terror group's cost-shifting parameter γ is altered and then investigate the elasticity of foreign investment to terror, which is given by

$$\epsilon_{i,a,\gamma} = \left(\frac{\mathrm{d}i}{\mathrm{d}\gamma}\frac{1}{i}\right)\left(\frac{\mathrm{d}a}{\mathrm{d}\gamma}\frac{1}{a}\right)^{-1}.$$

To begin analyzing this we employ the implicit function theorem to find

$$\frac{\mathrm{d}i}{\mathrm{d}\gamma} = \frac{-c_a^F c_a^T}{(-c_{aa}^F i + \gamma c_{aa}^T)(\eta\pi_{ii}^H + \pi_{ii}^W) - (c_a^F)^2} = \frac{-}{(+)(-)-(+)} > 0.$$

When terrorist's costs are chocked higher, firms respond by investing more in the host market. Naturally a shock to terrorists costs reduces their activities in equilibrium:

$$\frac{\mathrm{d}a}{\mathrm{d}\gamma} = \frac{-c_a^T(\eta\pi_{ii}^H + \pi_{ii}^W)}{(-c_{aa}^F i + \gamma c_{aa}^T)(\eta\pi_{ii}^H + \pi_{ii}^W) - (c_a^F)^2} = \frac{-(-)}{(+)(-)-(+)} < 0.$$

Using these two derivatives, we have

$$\epsilon_{i,a,\gamma} = \frac{-c_a^F c_a^T}{-c_a^T(\eta\pi_{ii}^H + \pi_{ii}^W)}\frac{a}{i} = \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W}\frac{a}{i} = \frac{+}{-}\frac{+}{+} < 0.$$

Shocks to the relative benefit of host versus world market investment Now as a preparatory step, we examine how equilibrium i and a respond to shocks to η. Recall that η shifts the relative attractiveness of investment in the host market compared to the rest of the world, and increases in η make the host market relative more appealing. Again using the implicit function theorem on our first order conditions, we have

$$\frac{\mathrm{d}i}{\mathrm{d}\eta} = \frac{-\pi_i^H(-c_{aa}^F i + \gamma c_{aa}^T)}{(-c_{aa}^F i + \gamma c_{aa}^T)(\eta\pi_{ii}^H + \pi_{ii}^W) - (c_a^F)^2} = \frac{(-)(+)}{(+)(-)-(+)} > 0.$$

An increase in international investment also increases the level of terror in equilibrium, as it grants terror groups new opportunities to run down multinationals' profits:

$$\frac{\mathrm{d}a}{\mathrm{d}\eta} = \frac{-\pi_i^H(c_a^F)}{(-c_{aa}^F i + \gamma c_{aa}^T)(\eta\pi_{ii}^H + \pi_{ii}^W) - (c_a^F)^2} = \frac{(-)(+)}{(+)(-)-(+)} > 0.$$

Now we can turn to our main comparative static: how is the elasticity of investment with respect to terror affected by the relative appeal of host market to world market investment?

$$\frac{\mathrm{d}\epsilon_{i,a,\gamma}}{\mathrm{d}\eta} = \frac{c_{aa}^F}{\eta\pi_{ii}^H + \pi_{ii}^W}\frac{a}{i}\frac{\mathrm{d}a}{\mathrm{d}\eta} - \frac{c_a^F}{(\eta\pi_{ii}^H + \pi_{ii}^W)^2}\frac{a}{i}\left(\pi_{ii}^H + \eta\pi_{iii}^H\frac{\mathrm{d}i}{\mathrm{d}\eta} + \pi_{iii}^W\frac{\mathrm{d}i}{\mathrm{d}\eta}\right) + \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W}\frac{1}{i}\frac{\mathrm{d}a}{\mathrm{d}\eta} - \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W}\frac{a}{(i)^2}\frac{\mathrm{d}i}{\mathrm{d}\eta}.$$

If we assume that $\pi_{iii}^H \leq 0$ and $\pi_{iii}^W \leq 0$ (as we have above) all of these terms are positive except for

$$\frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W}\frac{1}{i}\frac{\mathrm{d}a}{\mathrm{d}\eta}.$$

Note however that there is a simple sufficient condition for the final two terms to sum to something positive, which is that:

$$\frac{\mathrm{d}a}{\mathrm{d}\eta}\frac{1}{a} - \frac{\mathrm{d}i}{\mathrm{d}\eta}\frac{1}{i} < 0 \rightarrow \frac{\mathrm{d}i}{\mathrm{d}\eta}\frac{1}{i}\left(\frac{\mathrm{d}a}{\mathrm{d}\eta}\frac{1}{a}\right)^{-1} > 1 \rightarrow \epsilon_{i,a,\eta} > 1.$$

In words, this condition says that a positive shock to the relative benefits to firms from investing in the host

market should increase equilibrium investment by a greater percentage than it increases equilibrium terror.

This assumption can be simplified to the following condition:

$$\frac{-c_{aa}^F i + \gamma c_{aa}^T}{c_a^F} \frac{a}{i} > 1.$$

Alternatively, we can engage in a different decomposition of the problem to find an alternative sufficient condition.

$$\begin{aligned}
\frac{\mathrm{d}\epsilon_{i,a,\gamma}}{\mathrm{d}\eta} &< \frac{c_{aa}^F}{\eta\pi_{ii}^H + \pi_{ii}^W} \frac{a}{i} \frac{\mathrm{d}a}{\mathrm{d}\eta} + \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W} \frac{1}{i} \frac{\mathrm{d}a}{\mathrm{d}\eta} - \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W} \frac{a}{(i)^2} \frac{\mathrm{d}i}{\mathrm{d}\eta} \\
&= \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W} \frac{a}{i} \left(\frac{c_{aa}^F}{c_a^F} \frac{\mathrm{d}a}{\mathrm{d}\eta} + \frac{1}{a} \frac{\mathrm{d}a}{\mathrm{d}\eta} - \frac{1}{i} \frac{\mathrm{d}i}{\mathrm{d}\eta} \right) \\
&\propto -\frac{c_{aa}^F}{c_a^F} \frac{\mathrm{d}a}{\mathrm{d}\eta} - \frac{1}{a} \frac{\mathrm{d}a}{\mathrm{d}\eta} + \frac{1}{i} \frac{\mathrm{d}i}{\mathrm{d}\eta} \\
&\propto -c_{aa}^F \pi_i^H - \frac{\pi_i^H(c_a^F)}{a} + \frac{\pi_i^H(-c_{aa}^F i + \gamma c_{aa}^T)}{i} \\
&= -c_{aa}^F \pi_i^H - \frac{\pi_i^H(c_a^F)}{a} - \pi_i^H c_{aa}^F + \frac{\pi_i^H \gamma c_{aa}^T}{i}.
\end{aligned}$$

Note that all of these terms are positive but for:

$$-\frac{\pi_i^H(c_a^F)}{a}.$$

We also have two terms that look like:

$$-c_{aa}^F \pi_i^H.$$

So a sufficient condition is provided by:

$$-2c_{aa}^F \pi_i^H - \frac{\pi_i^H(c_a^F)}{a} > 0 \rightarrow 2c_{aa}^F < -\frac{c_a^F}{a}.$$

This condition lacks a clear intuitive interpretation, but has a class of solutions given by the second order differential equation $2f''(x) + f'(x)/x = 0$. One solution to this equation is $f(x) = 2k_1\sqrt{x} + k_2$ where k_1 and k_2 are arbitrary constants. So any function of the from $c^F(a) = a^z$ where $z < .5$ will satisfy out condition above.

A simple parametric form of the model We now sketch out a flexible set of functional forms to consider our two conditions that we have developed above. First, suppose that $c^F(a) = \rho^F a^{\theta^F}$ where $\rho^F > 0$ and $\theta^F \in (0, 1)$

and likewise that $c^T(a) = \rho^T a^{\theta^T}$ where $\theta^T \in (1, \infty)$. We then have that:

$$\begin{aligned}
\frac{-c^F_{aa} i + \gamma c^T_{aa}}{c^F_a} \frac{a}{i} &= \frac{-\rho^F \theta^F (\theta^F - 1) a^{\theta^F - 2} i + \gamma \rho^T \theta^T (\theta^T - 1) a^{\theta^T - 2}}{\rho^F \theta^F a^{\theta^F - 1}} \frac{a}{i} \\
&= \left(-(\theta^F - 1) a^{-1} i + \gamma \frac{\rho^T \theta^T}{\rho^F \theta^F} (\theta^T - 1) a^{\theta^T - \theta^F - 1} \right) \frac{a}{i} \\
&= \left(-(\theta^F - 1) i + \gamma \frac{\rho^T \theta^T}{\rho^F \theta^F} (\theta^T - 1) a^{\theta^T - \theta^F} \right) \frac{1}{i}
\end{aligned}$$

At this point we can use the first order condition to find that

$$i = \frac{\gamma c^T_a}{c^F_a} = \frac{\gamma \rho^T \theta^T a^{\theta^2 - 1}}{\rho^F \theta^F a^{\theta^F - 1}} = \gamma \frac{\rho^T \theta^T}{\rho^F \theta^F} a^{\theta^T - \theta^F}.$$

We now substitute this into the expression from above to get:

$$\frac{-c^F_{aa} i + \gamma c^T_{aa}}{c^F_a} \frac{a}{i} = \theta^T - \theta^F > 1.$$

Thus, our condition on the elasticity holds if $\theta^T > 1 + \theta^F$ and so, for example, holds for any $\theta^T > 2$.

Alternatively, we can see that the components of our second condition are

$$-\frac{\pi^H_i (c^F_a)}{a} = -\pi^H_i \rho^F \theta^F a^{\theta^F - 2}.$$

and

$$-c^F_{aa} \pi^H_i = -\pi^H_i \rho^F \theta^F (1 - \theta^F) a^{\theta^F - 2}.$$

So we need to know if

$$-2 c^F_{aa} \pi^H_i - \frac{\pi^H_i (c^F_a)}{a} \propto -2(1 - \theta^F) - 1 \geq 0.$$

This inequality will hold when $\theta^F \leq .5$.

Alternative assumptions about terrorist motivations

In this section, we can consider an alternative approach where the terror group is motivated either to minimize the multinational's investment i; maximize its own activities a; or maximize the multinational's costs $c^F(a)$; but not to minimize the multinational's profits as we examined above. As might be evident, these different assumptions yield somewhat different solutions which are nonetheless very similar in nature.

First, imagine that the terror group is aiming to minimize i. Assuming an interior solution for i, minimizing i as a goal requires maximizing activities a. So the first two cases we describe above are functionally equivalent. To model the cases, we assume a utility function $u^T(a)$ which has u^T_a and u^T_{aa}. Consequently, the terror group's problem is simply

$$\max_a u^T_a - \gamma c^T(a)$$

and optimal terror activities occur at the fixed level defined implicitly by $u_a^T(a^*) = \gamma c_a^T(a^*)$. Note that a^* is not a function of the investment activities i undertaken by the multinational (nor of the parameter η), and so this assumption about motives takes much of the strategic interaction out of the game. However, a is certainly increasing in γ.

Alternatively, we might imagine that the terrorist is aiming to maximize the multinational's costs. The terrorist's problem is then

$$\max_a c^F(a) - \gamma c^T(a).$$

This formulation leads to a different implicit solution for a^* ($c_a^F(a^*) = \gamma c_a^T(a^*)$) which has nonetheless has similar properties: a^* is not a function of i or η, but is increasing in γ. Note also that $c^F(a)$ has the same signs for its derivatives as with $u^F(a)$ and so we can analyze both cases with a common function. Henceforth, I will use $c^F(a)$ only.

We can now re-solve the multinational's problem, and derive comparative statics. First, the multinational's problem is:

$$\max_i \eta\pi^H(i) + \pi^W(i) - c^F(a)i$$

which leads to the implicit solution for i^* of

$$\eta\pi_i^H(i^*) + \pi_i^W(i^*) - c^F(a) = 0.$$

A Nash equilibrium is then given by the strategy pair (i^*, a^*). As before, I suppress the * notation henceforth to reduce clutter.

I first find $\epsilon_{i,a,\gamma}$ by finding the derivatives

$$\frac{\mathrm{d}i}{\mathrm{d}\gamma} = \frac{c_a^F c_a^T}{(\eta\pi_{ii}^H + \pi_{ii}^W)(c_{aa}^F - \gamma c_{aa}^T)} > 0$$

and

$$\frac{\mathrm{d}a}{\mathrm{d}\gamma} = \frac{c_a^T}{c_{aa}^F - \gamma c_{aa}^T} < 0.$$

Consequently,

$$\epsilon_{i,a,\gamma} = \frac{c_a^F}{(\eta\pi_{ii}^H + \pi_{ii}^W)} \frac{a}{i} < 0.$$

Checking again the comparative statics for η we have

$$\frac{\mathrm{d}i}{\mathrm{d}\eta} = \frac{-\pi_i^H}{\eta\pi_{ii}^H + \pi_{ii}^W} > 0 \qquad \text{and} \qquad \frac{\mathrm{d}a}{\mathrm{d}\eta} = 0.$$

Finally, we can again examine

$$\begin{aligned}
\frac{\mathrm{d}\epsilon_{i,a,\gamma}}{\mathrm{d}\eta} &= \frac{c_{aa}^F}{\eta\pi_{ii}^H + \pi_{ii}^W} \frac{a}{i} \frac{\mathrm{d}a}{\mathrm{d}\eta} - \frac{c_a^F}{(\eta\pi_{ii}^H + \pi_{ii}^W)^2} \frac{a}{i} \left(\pi_{ii}^H + \eta\pi_{iii}^H \frac{\mathrm{d}i}{\mathrm{d}\eta} + \pi_{iii}^W \frac{\mathrm{d}i}{\mathrm{d}\eta} \right) + \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W} \frac{1}{i} \frac{\mathrm{d}a}{\mathrm{d}\eta} - \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W} \frac{a}{(i)^2} \frac{\mathrm{d}i}{\mathrm{d}\eta} \\
&= -\frac{c_a^F}{(\eta\pi_{ii}^H + \pi_{ii}^W)^2} \frac{a}{i} \left(\pi_{ii}^H + \eta\pi_{iii}^H \frac{\mathrm{d}i}{\mathrm{d}\eta} + \pi_{iii}^W \frac{\mathrm{d}i}{\mathrm{d}\eta} \right) - \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W} \frac{a}{(i)^2} \frac{\mathrm{d}i}{\mathrm{d}\eta}.
\end{aligned}$$

If $\pi^H_{iii} \leq 0$ and $\pi^W_{iii} \leq 0$, the first term is positive; the second term is positive under all circumstances.

Model extension: incorporating a government

In this subsection, we extend the model by incorporating a government as a third strategic actor. We permit the government G to counter the effects of terrorism on the multinational's cost function through a policy instrument $g > 0$, which might represent counter-terrorism, security, or even non-security related policies targeted at multinationals like tax breaks. We therefore assumed that the firm's costs are a function of g ($c^F(a, g)$) and that these costs are decreasing in g with decreasing marginal returns, so $c^F_{gg} > 0$. We modify the objective functions for F and T from above by replacing $c^F(a)$ with $c^F(a, g)$. One thing that ends up being analytically important is the sign of the cross-partial derivative c^F_{ag}. We therefore consider three cases below: $c^F_{ag} < 0$; $c^F_{ag} > 0$; and $c^F_{ag} = 0$ and make no assumption at this point. The government pays a cost to create g according to the function $c^G(g)$ with $c^G_g > 0$ and $c^G_{gg} > 0$.

We now make an assumption about the government's objectives. We investigated giving the government an objective function analogous to the terror group's:

$$u_G(i, a, g) = \pi^H(i) - ic^F(a, g) - c^G(g).$$

This formulation yields predictable comparative statics for the simpler changes in parameters (with certain extra assumptions) however the expression for $\frac{\mathrm{d}\epsilon_{i,a,\gamma}}{\mathrm{d}\eta}$ is quite taxing with over a dozen terms. To simplify the analysis while still preserving an interesting interaction between the terror group and the government, we instead assume that the government's utility is given by:

$$u_G(i, a, g) = -c^F(a, g) - c^G(g).$$

The first order conditions we define an equilibrium assuming an interior solution are now given by:

$$\{\eta\pi^H_i(i^*) + \pi^W_i(i^*) - c^F(a^*, g^*) = 0 \quad -c^F_a(a^*, g^*)i^* + \gamma c^T_a(a^*) = 0 \quad -c^F_a(a^*, g^*) + \gamma c^G_g(g^*) = 0.\}$$

To find comparative statics with respect to γ, we totally differentiate and end up with the following linear system:

$$\begin{bmatrix} \eta\pi^H_{ii} + \pi^W_{ii} & -c^F_a & -c^F_g \\ -c^F_a & -c^F_{aa} + c^T_{aa} & -c^F_{ag} \\ 0 & -c^F_{ag} & -c^F_{gg} - c^G_{gg} \end{bmatrix} \begin{bmatrix} \frac{\mathrm{d}i}{\mathrm{d}\gamma} \\ \frac{\mathrm{d}a}{\mathrm{d}\gamma} \\ \frac{\mathrm{d}g}{\mathrm{d}\gamma} \end{bmatrix} = \begin{bmatrix} 0 \\ -c^T_a \\ 0 \end{bmatrix}.$$

The determinant of the matrix is

$$\begin{aligned} d &= (\eta\pi^H_{ii} + \pi^W_{ii})\left[(-c^F_{aa} + c^T_{aa})(-c^F_{gg} - c^G_{gg}) - (c^F_{ag})^2\right] + c^F_a\left[(-c^F_a)(-c^F_{gg} - c^G_{gg}) - c^F_g c^F_{ag}\right] \\ &= (-)[(+)(-) - (+)] + \left[(-)(-) + \text{sign}(c^F_{ag})\right]. \end{aligned}$$

This determinant is therefore positive with certainty if $\text{sign}(c^F_{ag}) \geq 0$ and positive if $(c^F_{ag}) < 0$ isn't too large in absolute value. We make that assumption for the remainder of the analysis in this subsection: c^F_{ag} *isn't too much smaller than zero*.

Table A1: Summary of comparative statics when government is included.

Assumption	$c^F_{ag} > 0$	$c^F_{ag} = 0$	$c^F_{ag} < 0$
$\frac{\mathrm{d}i}{\mathrm{d}\gamma}$	+	+	+
$\frac{\mathrm{d}a}{\mathrm{d}\gamma}$	-	-	-
$\frac{\mathrm{d}g}{\mathrm{d}\gamma}$	+	0	-
$\frac{\mathrm{d}i}{\mathrm{d}\eta}$	+	+	+
$\frac{\mathrm{d}a}{\mathrm{d}\eta}$	+	+	+
$\frac{\mathrm{d}g}{\mathrm{d}\eta}$	-	0	+
$\epsilon_{i,a,\gamma}$	-	-	-
$\frac{\epsilon_{i,a,\gamma}}{\mathrm{d}\eta}$	$+^*$	+	+

Notes: All comparative statics in the right hand column are under the assumption that c^F_{ag} isn't too much smaller than zero. The * comparative static is under the assumption that c^F_{ag} isn't too much greater than zero. Robust standard errors in parentheses.

Using Cramer's rule, we can now find the comparative statics up to a constant of proportionality.

$$\begin{aligned}
\frac{\mathrm{d}i}{\mathrm{d}\gamma} &\propto c^T_a\left[(-c^F_a)(-c^F_{gg}-c^G_{gg})-c^F_g c^F_{ag}\right]=\left[(-)(-)+\text{sign}(c^F_{ag})\right]\lesseqgtr 0\\
\frac{\mathrm{d}a}{\mathrm{d}\gamma} &\propto -c^T_a\left[(\eta\pi^H_{ii}+\pi^W_{ii})(-c^F_{gg}-c^G_{gg})\right]=-[(-)(-)]<0\\
\frac{\mathrm{d}g}{\mathrm{d}\gamma} &\propto c^T_a\left[(\eta\pi^H_{ii}+\pi^W_{ii})(-c^F_{ag})\right]=\left[(-)(-\text{sign}(c^F_{ag}))\right]\lesseqgtr 0.
\end{aligned}$$

Note that $\frac{\mathrm{d}i}{\mathrm{d}\gamma}$ is positive so long as c^F_{ag} isn't too much smaller than zero, but $\frac{\mathrm{d}a}{\mathrm{d}\gamma}$'s sign is determined by the sign of c^F_{ag}.

To find comparative statics with respect to η, we have the same system as above except that the system equals the vector:

$$\left[-\pi^H_{ii}\ \ 0\ \ 0\right]'.$$

Again using Cramer's rule we get:

$$\begin{aligned}
\frac{\mathrm{d}i}{\mathrm{d}\eta} &\propto (-\pi^H_i)\left[(-c^F_{aa}+\gamma c^T_{aa})(-c^F_{gg}-c^G_{gg})-(c^F_{ag})^2\right]=-[(+)(-)-(+)]>0\\
\frac{\mathrm{d}a}{\mathrm{d}\eta} &\propto \pi^H_i\left[(-c^F_a)(-c^F_{gg}-c^G_{gg})\right]=[(-)(-)]>0\\
\frac{\mathrm{d}g}{\mathrm{d}\eta} &\propto (-\pi^H_i)\left[(-c^F_a)(-c^F_{ag})\right]=-\left[(-)(-\text{sign}(c^F_{ag}))\right]\lesseqgtr 0.
\end{aligned}$$

Note that $\frac{\mathrm{d}g}{\mathrm{d}\eta}$ takes on the opposite sign of c^F_{ag}. At this point, note that all of the comparative statics for i and a are identical to the case without a government under our assumption that c_{ag} isn't to much smaller than zero.

We now look at our main quantity of interest and its derivative with respect to η. We first note that $\epsilon_{i,a,\gamma}$ can be decomposed into our original formulation of this (in the model absent the government) plus an

Table A2: Terror reduces exports of US MNCs from developing countries

	Terror count	Intra-firm exports		Placebo
	1	2	3	4
Rel. wtd. terror	0.871			
	(0.177)			
Terror count		−1.194	−2.441	−0.165
		(0.613)	(2.647)	(0.433)
Geo. wtd. terror	0.327	0.384	0.321	−0.404
	(0.185)	(0.524)	(1.116)	(0.315)
ln GDP pc			1.047	
			(1.022)	
GDP growth			0.065	
			(0.822)	
ln Population			3.526	
			(2.664)	
BIT with US			−0.770	
			(2.305)	
Polyarchy			0.123	
			(1.374)	
ln Civil con bd			0.721	
			(0.844)	
Intercept	4.393	22.007	−36.803	17.456
	(0.329)	(3.253)	(40.761)	(2.344)
N	1620	1620	1596	1620
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

additional term.

$$\epsilon_{i,a,\gamma} = \frac{c_a^F(-c_{gg}^F - c_{gg}^G) + c_g^F c_{ga}^F}{(\eta\pi_{ii}^H + \pi_{ii}^W)(-c_{gg}^F - c_{gg}^G)}\frac{a}{i} = \frac{c_a^F}{\eta\pi_{ii}^H + \pi_{ii}^W}\frac{a}{i} + \frac{c_g^F c_{ag}^F}{(\eta\pi_{ii}^H + \pi_{ii}^W)(-c_{gg}^F - c_{gg}^G)}\frac{a}{i}.$$

We define this second term as

$$\Lambda \equiv \frac{c_g^F c_{ag}^F}{(\eta\pi_{ii}^H + \pi_{ii}^W)(-c_{gg}^F - c_{gg}^G)}\frac{a}{i}.$$

Λ's sign is driven by the sign of c_{ag}^F. Where $c_g^F c_{ag}^F$ is positive or zero, then $\Lambda < 0$ and so $\epsilon_{i,a,\gamma} < 0$. Likewise, as long as c_{ag}^F isn't too much smaller than zero we still have $\epsilon_{i,a,\gamma} < 0$ although $\Lambda > 0$. However, if c_{ag}^F is negative and far from zero, then it is possible that signs might be reversed. The intuition for this is as follows. Investment i is generally increased by γ which also drives down a. If c_{ag}^F is sharply negative, then g will dramatically reduce when γ increases. In this way, the government overcompensates for the reduction in terror by drastically reducing anti-terror operations. They do so because the marginal returns to those operations is sharply lowered as terror decreases when c_{ag}^F is large and negative.

Our decomposition of $\epsilon_{i,a,\gamma}$ also helps us to differentiate $\epsilon_{i,a,\gamma}$ with respect to η because it means we can focus on $\Lambda < 0$. Under our assumptions described above, we know with a certainty that the first term will

be increasing in η. So we focus on differentiating the second term. This partial derivative is given by:

$$\begin{aligned}\propto \quad & \left(c^F_{gg}c^F_{ag} + c^F_g c^F_{agg}\right)\frac{\mathrm{d}g}{\mathrm{d}\eta} + \left(c^F_{ag}c^F_{ag} + c^F_g c^F_{aga}\right)\frac{\mathrm{d}a}{\mathrm{d}\eta} + \\ & c^F_g c^F_{ag}\left((\eta\pi^h_{iii} + \pi^W_{iii})(-c^F_{gg} - c^G_{gg})\right)\frac{\mathrm{d}i}{\mathrm{d}\eta} + \left((\eta\pi^h_{ii} + \pi^W_{ii})(-c^F_{ggg} - c^G_{ggg})\right)\frac{\mathrm{d}g}{\mathrm{d}\eta} + \\ & c^F_g c^F_{ag}\left(-\frac{\mathrm{d}a}{\mathrm{d}\eta} + \frac{a}{i^2}\frac{\mathrm{d}i}{\mathrm{d}\eta}\right)\end{aligned}$$

We will simplify this expression by assuming that all third derivatives involving g are equal to zero, including third cross-partials. We thus have:

$$\propto \quad \left(c^F_{gg}c^F_{ag}\right)\frac{\mathrm{d}g}{\mathrm{d}\eta} + \left(c^F_{ag}c^F_{ag}\right)\frac{\mathrm{d}a}{\mathrm{d}\eta} + c^F_g c^F_{ag}\left((\eta\pi^h_{iii} + \pi^W_{iii})(-c^F_{gg} - c^G_{gg})\right)\frac{\mathrm{d}i}{\mathrm{d}\eta} + c^F_g c^F_{ag}\left(-\frac{\mathrm{d}a}{\mathrm{d}\eta} + \frac{a}{i^2}\frac{\mathrm{d}i}{\mathrm{d}\eta}\right).$$

Note that this is equal to zero if $c^F_{ag} = 0$, which means that our original comparative static holds: $\frac{\mathrm{d}\epsilon_{i,a,\gamma}}{\mathrm{d}\eta} > 0$. Note also that the first and second terms are always positive. If $c^F_{ag} < 0$ then the third term will be positive, and likewise the fourth term will be positive too under our Assumption 1 (which ensures that $-\frac{\mathrm{d}a}{\mathrm{d}\eta} + \frac{a}{i^2}\frac{\mathrm{d}i}{\mathrm{d}\eta} > 0$). On the other hand, if $c^F_{ag} > 0$, the sign of the expression above is ambiguous. If c^F_{ag} were drastically greater than zero, then the sign of the entire comparative static might be tipped negative. Consequently, preserving the integrity of our original analysis requires that $|c^F_{ag}|$ not be too large.

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Appendix B:

Higher dimensional fixed effects

Table B1: MNCs exports are less responsive to terror when outside options are weaker

Second stage: DV Intra-firm trade:				
Terror count	−0.151	−0.252	−0.191	−0.613
	(0.079)	(0.074)	(0.070)	(0.088)
: Input match	0.424			0.361
	(0.063)			(0.063)
: Input alternatives	−0.240			0.238
	(0.026)			(0.027)
: Real estate		0.093		0.030
		(0.054)		(0.056)
: Leased assets		0.292		0.236
		(0.056)		(0.065)
: Unskilled labor			0.229	0.251
			(0.061)	(0.063)
: Skilled labor			0.036	−0.018
			(0.060)	(0.065)
Geo. wtd. terror	−0.061	−0.082	−0.082	−0.065
	(0.074)	(0.073)	(0.073)	(0.073)
Intercept	−0.469	−0.485	−0.485	−0.472
	(0.040)	(0.040)	(0.039)	(0.039)
N	165240	165240	165240	165240
Country-3 Digit Ind. FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Second stage: DV Intra-firm trade:				
Terror count	−0.431	−0.306	−0.197	−0.827
	(0.064)	(0.059)	(0.055)	(0.075)
: Input match	0.519			0.543
	(0.053)			(0.054)
: Input alternatives	0.218			0.306
	(0.050)			(0.053)
: Real estate		0.198		0.116
		(0.047)		(0.048)
: Leased assets		0.295		0.215
		(0.048)		(0.053)
: Unskilled labor			0.275	0.344
			(0.048)	(0.054)
Geo. wtd. terror	−0.057	−0.082	−0.082	−0.056
	(0.058)	(0.058)	(0.058)	(0.058)
Intercept	−0.467	−0.485	−0.485	−0.466
	(0.031)	(0.031)	(0.031)	(0.031)
N	165240	165240	165240	165240
Country-4 Digit Ind. FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Reduced form estimates

Table B2: Reduced form models

	Intra-firm trade			
Terror count	−0.479	−0.517	−0.514	−0.476
	(0.024)	(0.024)	(0.024)	(0.027)
: Input match	0.614	0.584	0.581	0.555
	(0.024)	(0.024)	(0.023)	(0.025)
: Input alternatives	−0.113	−0.017	−0.020	−0.007
	(0.017)	(0.017)	(0.017)	(0.019)
: Real estate	−0.073	−0.080	−0.080	−0.079
	(0.020)	(0.019)	(0.019)	(0.020)
: Leased assets	0.162	0.150	0.152	0.134
	(0.022)	(0.022)	(0.021)	(0.022)
: Unskilled labor	0.259	0.266	0.268	0.295
	(0.024)	(0.023)	(0.023)	(0.024)
: Skilled labor	0.044	0.068	0.066	0.060
	(0.022)	(0.022)	(0.021)	(0.022)
Geo. wtd. terror	−0.071	−0.074	−0.074	0.162
	(0.079)	(0.078)	(0.076)	(0.084)
ln GDP pc				−0.047
				(0.057)
GDP growth				0.035
				(0.097)
ln Population				−1.792
				(0.218)
BIT with US				0.133
				(0.454)
Polyarchy				0.032
				(0.162)
ln Civil con. casualties				−0.023
				(0.016)
Intercept	−0.457	−1.232	0.563	0.460
	(0.044)	(0.060)	(0.079)	(0.097)
N	165240	165240	165240	144942
Country FE	Yes	Yes	Yes	Yes
2 Digit Ind. FE	No	Yes	Yes	Yes
3 Digit Ind. FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Lagged dependent variables

Table B3: Inclusion of lagged dependent variables

	2SLS		OLS	
Terror count	−0.507	−0.473	−0.124	−0.108
	(0.024)	(0.024)	(0.013)	(0.013)
: Input match	0.546	0.537	0.300	0.297
	(0.019)	(0.019)	(0.012)	(0.012)
: Input alternatives	−0.075	−0.089	−0.039	−0.046
	(0.018)	(0.018)	(0.012)	(0.012)
: Real estate	0.019	0.051	0.003	0.020
	(0.016)	(0.016)	(0.011)	(0.011)
: Leased assets	0.094	0.193	0.051	0.102
	(0.020)	(0.019)	(0.013)	(0.012)
: Unskilled labor	−0.038	0.042	−0.016	0.025
	(0.019)	(0.018)	(0.013)	(0.013)
: Skilled labor	0.254		0.129	
	(0.021)		(0.014)	
Geo. wtd. terror	0.074	0.074	−0.234	−0.233
	(0.032)	(0.032)	(0.020)	(0.020)
IFE_{t-1}	0.860	0.861	0.854	0.855
	(0.002)	(0.002)	(0.001)	(0.001)
Intercept	0.420	0.416	0.492	0.489
	(0.028)	(0.028)	(0.027)	(0.027)
N	192780	192780	192780	192780
Year FE	Yes	Yes	Yes	Yes

Additional results on outside options and terrorism

Table B4: Countries with less elastic investment have more terror

	All terror			
	1	2	3	4
Input match	1.288			1.044
	(0.143)			(0.162)
Lack of alternatives	−0.680			−0.409
	(0.146)			(0.186)
Real estate		0.053		0.172
		(0.131)		(0.144)
Leased assets		0.876		0.532
		(0.130)		(0.171)
Unskilled labor			0.555	−0.045
			(0.211)	(0.236)
Skilled labor			−0.783	−0.020
			(0.211)	(0.260)
Geo. wtd. terror	0.699	0.803	0.839	0.738
	(0.122)	(0.121)	(0.122)	(0.123)
Rel. wtd. terror	1.085	1.023	1.039	1.061
	(0.105)	(0.107)	(0.107)	(0.106)
Intercept	−0.618	−0.843	−0.266	−0.973
	(0.177)	(0.192)	(0.176)	(0.269)
N	1974	1974	1974	1974
Year FE	Yes	Yes	Yes	Yes