The Impact of Transnational Terrorism on U.S. Foreign Direct Investment

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This article investigates the extent to which transnational terrorist attacks altered U.S. foreign direct investment (FDI). Time-series intervention analysis shows that 9/11 generally had little lasting influence on U.S. FDI flows. Only a few countries that experienced subsequent terrorist attacks displayed a post-9/11 drop in U.S. FDI flows, which, except for Turkey, was not long-lived. For a panel of countries, this study also examines the effect that terrorist attacks against U.S. interests had on the stock of U.S. FDI. Based on a methodology previously applied to the study of U.S. assets abroad, we find that such attacks had a significant, but small, impact on these stocks in OECD countries. Greece and Turkey displayed the largest declines—5.7 percent and 6.5 percent of their average U.S. FDI stocks, respectively. There was no such effect for non-OECD countries. Terrorist efforts to limit U.S. FDI have been cost-effective.

Terrorist campaigns are intended to impose sufficient political and economic costs on a government so that it concedes, at least in part, to the political demands of the terrorists. In its May report, the Joint Economic Committee (2002) of the U.S. Congress details the various costs associated with terrorist attacks. In addition to the direct loss of human and nonhuman capital, the report characterizes increased security costs as a tax on the economy. The report also indicates that the risk of subsequent attacks ". . . induces investors, for example, to move out of riskier assets, . . . as well as commitments for long-term investments. . ." (Joint Economic Committee 2002: 2). Some terrorists seek to reduce U.S. foreign direct investment (FDI) to hurt not only U.S. investors but also those countries that host these investments. Annually, 40 percent of all transnational terrorist attacks are directed against U.S. interests (i.e., its people and property) but few attacks are staged on U.S. soil (Enders and Sandler 2006). By augmenting risks, these attacks may have a significant effect on reducing U.S. FDI.

The purpose of this article is to quantify the extent to which terrorism has altered the level or composition of U.S. assets abroad through the creation of an atmosphere of intimidation and fear. U.S. firms and investors are anticipated to shift assets from high-terrorism countries to safer venues for a number of reasons. First, even in the absence of a direct terrorist attack, protecting facilities from potential attacks raises operating costs and, therefore, limits returns. In addition to the costs of directly securing a plant, building, or office, a firm in a hostile environment must maintain security clearance for its employees and pay additional insurance charges. Second, terrorist attacks can destroy infrastructure, thereby causing business disruptions. For example, a terrorist attack on a railroad line may cause shipping delays for a substantial period of time. Third, recruiting costs may rise because personnel from the home office may not wish to work in a terrorism-prone region. These enhanced costs reduce the returns on U.S. FDI and may divert these assets elsewhere. Fourth, terrorism augments the general level of uncertainty, which redirects FDI to safer venues.

In the first part of the study, we apply time-series methods to ascertain the behavior of U.S. FDI flows immediately before and after the four terrorist hijackings on September 11, 2001 (henceforth, 9/11). Based on intervention analysis, we determine that 9/11 had little lasting influence on the location of these FDI flows. In the second part, we examine the effect that transnational terrorist attacks against U.S. interests abroad had on the stock of U.S. FDI for a panel of 69 countries. These attacks had a small, but significant, impact on U.S. FDI *stocks* in the Organization of Economic Cooperation and Development (OECD) countries but had no significant consequence on these stocks in non-OECD countries. For OECD countries, the reduction in U.S. FDI stocks increased with the level of violence associated with the attacks—i.e., terrorist incidents with no casualties had a smaller effect on FDI than incidents with casualties or deaths. The relatively small impact on U.S. FDI stocks for the sample period (1989-1999) is due, in part, to the modest number of attacks against a U.S. target in sample countries.

Our findings are somewhat different from those in the literature. Enders and Sandler (1996) showed that transnational terrorism reduced annual net foreign direct investment (NFDI) flows in Spain by 13.5 percent and in Greece by 11.9 percent. In this earlier study, the large effect is due,

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in part, to the relatively high level of terrorism experienced by these countries during the sample period that ran from the mid-1970s to 1991. In contrast to Enders and Sandler (1996), the current panel study examines just U.S. FDI and not all FDI. In addition, we focus on FDI stocks for the panel estimations, which are less volatile than flows. The current study includes many large diversified economies that allow resource substitution from threatened to non-threatened sectors, thus cushioning the impact of terrorism (Enders, Sandler, and Parise 1992). These large OECD nations can deploy security measures and economic policies to win back investors' confidence. Moreover, most of the terrorism in the sample period was not directed at FDI per se, unlike the earlier study of Spain and Greece.

Blomberg, Hess, and Orphanides (2004) uncovered a small negative influence of transnational terrorist incidents on *economic growth* in developing countries, but not in the OECD countries.[1] This reduced growth was attributed to investment spending being redirected to government spending to bolster security. In another study, Blomberg and Mody (2005) showed that violence in various forms had a larger deterrent effect on FDI in developing than developed nations, consistent with the notion that the latter can cushion the economic consequences of terrorism. The current study also differs by using U.S. FDI stocks as the dependent variable,[2] which is appropriate because these stocks are prevalent in many OECD countries. Such stocks are less important in non-OECD countries, thus supporting our failure to find an influence for this subsample.

BACKGROUND

Terrorism is the premeditated use, or threat of use, of extranormal violence by individuals or subnational groups to obtain a political objective through intimidation or fear directed at a large audience beyond that of the immediate victims. Acts of violence that have no specific political motive are crimes rather than terrorist acts: the shooters at Columbine High School on April 20, 1999, were criminals while the Chechens that killed at least 335 children, parents, and teachers at Middle School No. 1 in the city of Beslan on September 8, 2004, were terrorists. Another fundamental ingredient in the definition is the creation of widespread intimidation or fear. Unlike warfare where the aim is to destroy opposing combatants and military assets, terrorists seek to affect those not immediately involved with the political decision-making process, so that sufficient pressures to concede to terrorists' demands are imposed on decision makers (Bueno de Mesquita 2005; Kydd and Walter 2002).

Any noteworthy terrorist incident may deter FDI. Terrorist incidents specifically directed at U.S. interests abroad are more apt to impact U.S. FDI. We are interested in quantifying the relationships, if any, between terrorism and U.S. FDI, because these investments are an important source of growth in today's globalized world. Thus, this exercise suggests, in part, the extent to which terrorists are able to hurt U.S. economic interests and those of the world. We rely on transnational terrorist attacks because a data set of domestic and transnational attacks is not currently available. Moreover, transnational terrorist incidents are more germane to U.S. FDI abroad, because a specific attack on U.S. firms or their personnel in a host country is a transnational terrorist incident.

Transnational terrorism occurs when an incident in one country involves victims, perpetrators, targets, governments, *or* institutions of another country. The bombings that destroyed the U.S. embassies in Kenya and Tanzania on August 7, 1998 are instances of transnational terrorism. In contrast, domestic terrorism is homegrown and home directed with implications for just the host country—i.e., it cannot be aimed at the interests or investments of another country. The bombing of the Alfred P. Murrah Federal Building in Oklahoma City on April 19, 1995, is a domestic terrorist incident.

Our data on transnational terrorist incidents are drawn from *International Terrorism: Attributes of Terrorist Events* (ITERATE), a data set that records the incident date, location, type, number of people killed, and number of people wounded (Mickolus et al. 2004). ITERATE relies on the world's news print and electronic media for its information with a large reliance on the Foreign Broadcast Information Service (FBIS) *Daily Reports*, which survey a couple hundred of the world's newspapers and related sources. This data source excludes terrorist incidents associated with declared wars or major military interventions as well as guerrilla attacks on military targets of an occupying force. Even though ITERATE records events on a daily basis, we used quarterly totals to be consistent with the other variables in the analysis. Quarterly values of the stock of U.S. FDI for the sample periods are obtained from the Bureau of Economic Analysis' website (www.bea.doc.gov/bea/di1.htm).

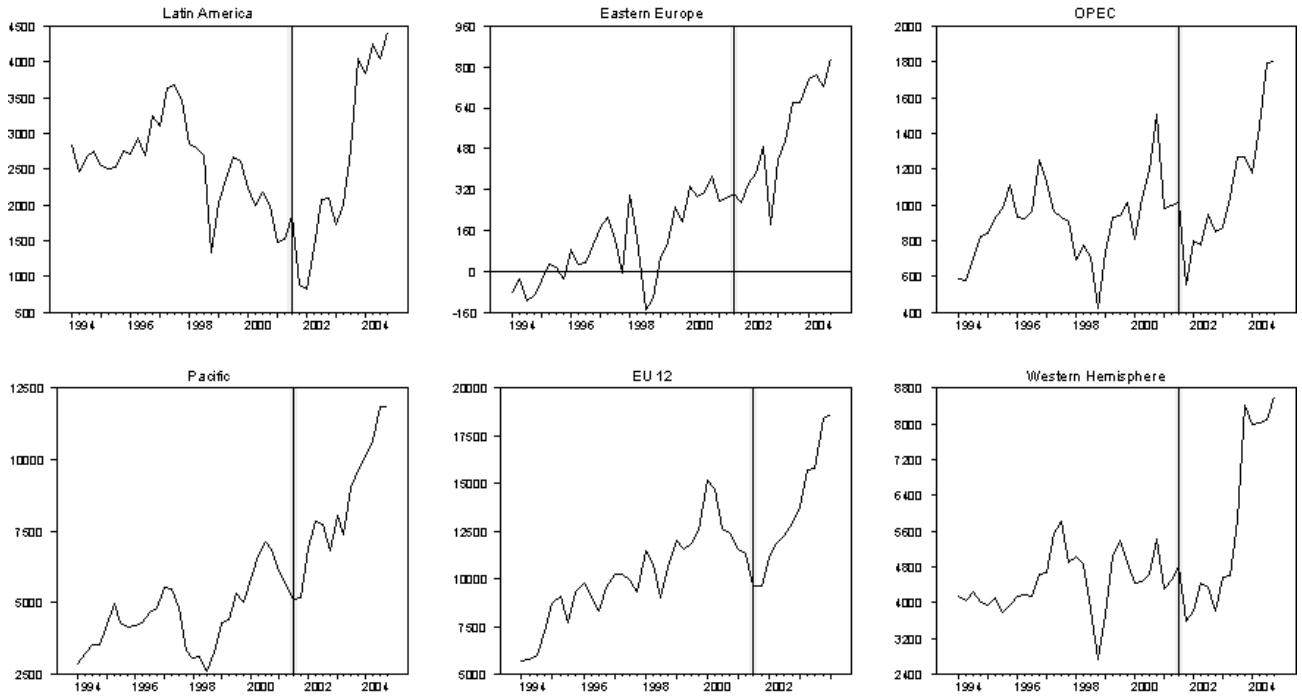
THE TIME PATHS OF U.S. FIA AND U.S.-TARGETED TERRORISM

The six panels of Figure 1 show the quarterly values of U.S. FDI flows for a number of selected regions from the first quarter of 1994 (denoted by 1994:Q1) through 2004:Q4. When highlighting the influence of 9/11 on U.S. FDI, we rely on flows because the post-9/11 period is too short to permit changes in stocks, which take longer to adjust. The shaded vertical line in each panel in Figure 1 depicts 2001:Q3 to separate the pre- and post-9/11 period. The figure has some noteworthy features. For all six regions, the average value of U.S. FDI flows for the post-9/11 period eventually exceeded that of the last few years prior to 9/11. For example, even though U.S. FDI flows in Latin America

[1] Tavares (2004) found that the output cost of a typical terrorist attack decreases as the level of democracy increases. This result concurs with the modest impact that we uncover for OECD countries as terrorism reduces U.S. FDI, which is a source of savings and growth.

[2] Unlike the earlier Blomberg, Hess, and Orphanides (2004) studies, we use the number of terrorist attacks and not a dummy variable for the presence of terrorism. In so doing, we can quantify the impact based on the number of terrorist events.

FIGURE 1
U.S. FDI IN SELECTED REGIONS (MILLIONS OF 1994 $)



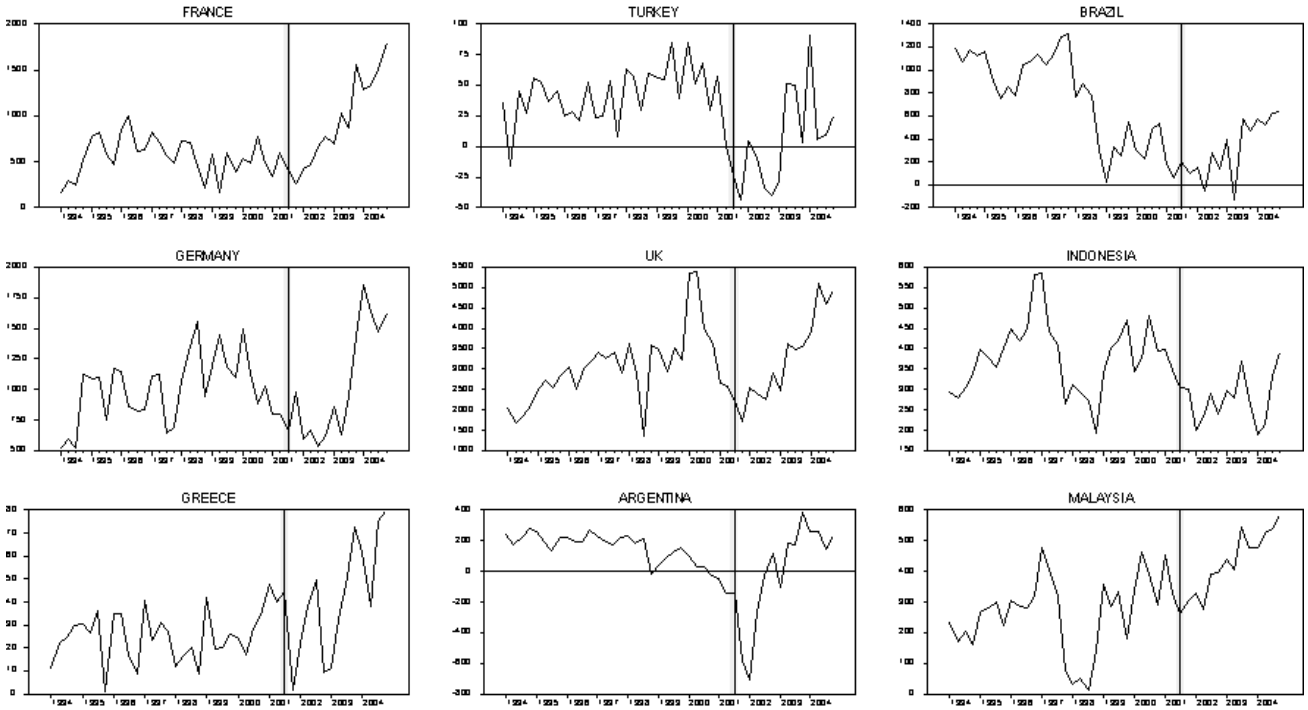
had been declining steadily since the mid-1990s, there was a huge rebound in 2002. Although it was delayed until 2003, the jump in FDI for the Western Hemisphere is even more dramatic. U.S. FDI generally grew in Eastern Europe, the Pacific, the OPEC countries, and the European Union 12 (EU) during the post-9/11 period. FDI growth setbacks—e.g., for Eastern Europe for part of 2002—were short-lived. The largest impact of 9/11 on U.S. FDI flows appears to be in Latin America, the Western Hemisphere, and the OPEC countries. The first two regions were in the closest proximity to the attack, while the OPEC countries were home to many of the 9/11 hijackers. This latter fact raised risk concerns for U.S. investment flows into the region. As seen in Figure 1, the recovery of U.S. FDI was slowest in the Western Hemisphere. Based on FDI levels at the time of 9/11, the Pacific, the EU, and Eastern Europe were hardly affect by these hijackings.

Figure 2 shows that the regional patterns for U.S. FDI are not descriptive of all of the component governments. For some countries (e.g., France, Germany, and the United Kingdom), U.S. FDI flows fell but then quickly rebounded before a growth spurt. For Argentina, Greece, and Turkey, the decline was particularly sharp and the rebound has been intermittent, perhaps owing to other factors. Brazil and Indonesia did not experience the persistent growth in U.S. FDI flows, exhibited by their geographical region. For Indonesia, U.S. FDI has been falling prior to 9/11; for Brazil, U.S. FDI in 2004 exceeded its 2000 and 2001 levels so that a sustained recovery took hold.

Table 1 reports three descriptive statistics for U.S. FDI for several crucial time periods. For example, the mean quarterly value of U.S. FDI flows to the EU from 1994:Q1 through the last complete year prior to 2001 was 10,033.38 millions of 1994 U.S. dollars.[3] For the last three complete years prior to 2001, the mean quarterly value U.S. FDI flows was 12,065.56 millions of 1994 U.S. dollars; this figure is 120.25 percent of the full seven-year quarterly average. Over the three post-9/11 years, the quarterly mean of U.S. FDI flows was 14,502.32 millions of 1994 U.S. dollars or 144.54 percent of the 1994:Q1-2000:Q4 average. Thus, real U.S. FDI flows grew in the EU during the post-9/11 period. There are several other key features in Table 1. First, U.S. FDI flows rose faster on average in Mexico and Canada than for the Western Hemisphere in general. Second, by the end of 2004, Latin America had recovered losses in these FDI flows, experienced in the three years prior to 9/11. Latin America did not display any major post-9/11 reduction in U.S. FDI flows for the 2002:Q1-2004:Q4 period; however, these flows fell significantly in Brazil and rose greatly in Mexico. Third, from the vantage of the three years following 9/11, U.S. FDI flows generally grew in the OPEC nations. Fourth, for the Middle East, Saudi Arabia displayed large gains in U.S. FDI flows despite a decline prior to 9/11. These flows rose in Egypt at a greater rate than in the OPEC nations. Israel and Turkey experienced declines in U.S. FDI, with the decrease more pronounced for Turkey. Fifth, in the Pacific, the big losers of U.S. FDI were the Philippines and Indonesia. The greatest gainers were China, Japan, and

[3] We use complete years insofar the data have not been seasonally adjusted. Alternatively, we could seasonally adjust the data and then compare the 2001:Q4-2004:Q1 period to other sample periods.

FIGURE 2
U.S. FDI IN SELECTED COUNTRIES (MILLIONS OF 1994 $)



Singapore; these countries accounted for much of the regional increase during the post-9/11 period.

Figure 3 shows the quarterly number of transnational terrorist events *against U.S. targets* in seven select countries and two country groups. Some noteworthy variations characterize the displayed countries and regions. Spain and the Philippines experienced a constant level of terrorist attacks over the sample period. This is also true for Egypt since 1997. Generally, the level of transnational terrorism against U.S. interests declined in Europe; the large spikes in France and Greece in the mid-1990s have not returned. In contrast, Indonesia displayed a spike in U.S.-directed terrorism in 1999, while Turkey displayed an increase in U.S.-directed terrorism in the latter part of the sample period.

Figure 4 displays the quarterly totals of all transnational terrorist incidents occurring in the OECD (broken plot) and in non-OECD nations (solid plot). There are typically far more terrorist incidents in the non-OECD than in OECD countries. Both time series exhibit steady declines from the mid-1990s until 1998. Transnational terrorism in non-OECD nations displays a jump in 1998:Q3 that lasted until 2000:Q3. For non-OECD countries, transnational terrorism began to grow in mid-2001; for OECD countries, transnational terrorism began to grow in mid 2002.

The empirical issue is whether these shifts in the level of U.S.-targeted terrorism have been associated with any major shifts in the flow of U.S. FDI. On the surface, there appears to be no simple relationship between the two. For example, U.S. FDI in Europe grew while terrorism against U.S. interests in Europe declined. In contrast, U.S.-targeted terrorism spikes in Indonesia and Turkey coincided with a growth spurt in U.S. FDI in those nations. Eyeballing the data and using simple comparisons of the pre-9/11 and post-9/11 periods are useful ways to determine if there might be a structural break in the U.S. FDI series. A more formal test for the presence of a structural break in the neighborhood of 9/11 is to apply intervention analysis (see, e.g., Enders and Sandler 2006). Since the individual U.S. FDI series may not be stationary, we first test for a unit root using Perron's (1989) test. A key advantage of Perron's (1989) test over the standard Dickey-Fuller unit-root test is that the former allows for structural breaks in the intercept *and/or* trend of a time-series estimates of a variable. Consider the regression equation:

$$y_t = a_0 + a_1 D_p + a_2 D_L + (a_3 + \gamma D_L)t + \rho y_{t-1} + \varepsilon_t, \qquad (1)$$

where y_t is the dependent variable of interest; y_{t-1} is the lagged dependent variable; t represents time; D_p is a pulse (i.e., a temporary) dummy variable that equals zero in all periods except 2001:Q4 where it equals 1; D_L equals 0 for all t up to and including 2001:Q3 and equals 1 thereafter; and ε_t is a random error term.[4] In Equation (1), a_0 is an intercept, while $a_i (i = 1,2,3)$, γ, and ρ are coefficients. In the absence of the dummy variables, the specification in Equation (1) is identical to the traditional Dickey-Fuller test. If, however, $a_1 \neq 0$, the intercept in the post-9/11 period (for

[4] For the pulse dummy, the results for some countries are quite different if the pulse D_p equals 1 at 2001:Q3.

TABLE 1
SUMMARY STATISTICS FOR U.S. FDI IN SELECTED REGIONS AND COUNTRIES

Region/Country	Period Start	Period End	Mean[a]	Standard Deviation[a]	Percent of Initial Period
EU	1994:Q1	2000:Q4	10033.38	2395.22	
	1998:Q1	2000:Q4	12065.56	1682.35	120.25
	2002:Q1	2004:Q4	14502.32	2768.71	144.54
France	1994:Q1	2000:Q4	559.61	215.95	
	1998:Q1	2000:Q4	508.20	190.75	90.81
	2002:Q1	2004:Q4	1034.88	457.30	184.93
Greece	1994:Q1	2000:Q4	23.84	10.09	
	1998:Q1	2000:Q4	22.44	9.32	94.15
	2002:Q1	2004:Q4	45.10	24.01	189.16
Spain	1994:Q1	2000:Q4	314.09	97.24	
	1998:Q1	2000:Q4	389.54	62.54	124.02
	2002:Q1	2004:Q4	975.04	237.47	310.44
EASTERN EUROPE	1994:Q1	2000:Q4	90.03	149.71	
	1998:Q1	2000:Q4	175.07	171.13	194.46
	2002:Q1	2004:Q4	561.43	200.98	623.63
WESTERN HEMISPHERE	1994:Q1	2000:Q4	4460.86	664.67	
	1998:Q1	2000:Q4	4547.51	775.54	101.94
	2002:Q1	2004:Q4	6047.01	1989.17	135.56
Canada	1994:Q1	2000:Q4	2512.84	820.94	
	1998:Q1	2000:Q4	3001.00	960.71	119.43
	2002:Q1	2004:Q4	4128.82	1011.01	164.31
Mexico	1994:Q1	2000:Q4	800.03	266.12	
	1998:Q1	2000:Q4	1009.43	117.22	126.17
	2002:Q1	2004:Q4	1482.98	501.06	185.37
MIDDLE EAST					
Saudi Arabia	1994:Q1	2000:Q4	90.77	37.46	
	1998:Q1	2000:Q4	78.50	32.80	86.47
	2002:Q1	2004:Q4	134.88	101.91	148.59
Egypt	1994:Q1	2000:Q4	79.17	36.47	
	1998:Q1	2000:Q4	87.40	50.94	110.40
	2002:Q1	2004:Q4	126.39	44.02	159.64
Israel	1994:Q1	2000:Q4	67.48	52.85	
	1998:Q1	2000:Q4	85.94	77.05	127.36
	2002:Q1	2004:Q4	65.62	68.73	97.25
Turkey	1994:Q1	2000:Q4	42.79	21.86	
	1998:Q1	2000:Q4	56.37	17.93	131.72
	2002:Q1	2004:Q4	25.49	66.32	59.57
OPEC	1994:Q1	2000:Q4	904.38	223.00	
	1998:Q1	2000:Q4	898.08	278.44	99.30
	2002:Q1	2004:Q4	1169.41	360.78	129.31
PACIFIC	1994:Q1	2000:Q4	4486.31	1212.14	
	1998:Q1	2000:Q4	4801.81	1579.76	107.03
	2002:Q1	2004:Q4	8929.18	1830.29	199.03
China	1994:Q1	2000:Q4	135.49	98.26	
	1998:Q1	2000:Q4	184.55	96.38	136.21
	2002:Q1	2004:Q4	588.99	216.12	434.69

continued on next page

TABLE 1 (continued)

Region/Country	Period Start	Period End	Mean[a]	Standard Deviation[a]	Percent of Initial Period
Indonesia	1994:Q1	2000:Q4	380.24	90.22	
	1998:Q1	2000:Q4	358.23	83.33	94.21
	2002:Q1	2004:Q4	276.54	64.66	72.73
Japan	1994:Q1	2000:Q4	871.25	385.30	
	1998:Q1	2000:Q4	975.90	464.87	112.01
	2002:Q1	2004:Q4	2144.44	553.49	246.13
South Korea	1994:Q1	2000:Q4	202.68	100.46	
	1998:Q1	2000:Q4	254.05	96.73	125.34
	2002:Q1	2004:Q4	351.08	60.08	173.22
Malaysia	1994:Q1	2000:Q4	257.41	121.57	
	1998:Q1	2000:Q4	240.00	152.51	93.24
	2002:Q1	2004:Q4	447.61	93.34	173.22
Philippines	1994:Q1	2000:Q4	120.04	32.75	
	1998:Q1	2000:Q4	112.66	32.67	93.85
	2002:Q1	2004:Q4	101.95	73.45	84.93
Singapore	1994:Q1	2000:Q4	665.87	205.17	
	1998:Q1	2000:Q4	676.95	275.76	101.66
	2002:Q1	2004:Q4	1989.78	306.05	298.82
Taiwan	1994:Q1	2000:Q4	195.92	73.29	
	1998:Q1	2000:Q4	259.06	68.16	132.23
	2002:Q1	2004:Q4	323.47	71.15	165.10
LATIN AMERICA	1994:Q1	2000:Q4	2652.56	508.65	
	1998:Q1	2000:Q4	2312.23	442.19	87.17
	2002:Q1	2004:Q4	2793.13	1262.84	105.30
Brazil	1994:Q1	2000:Q4	801.77	371.70	
	1998:Q1	2000:Q4	451.65	258.85	56.33
	2002:Q1	2004:Q4	348.78	268.07	43.50

[a]In millions of 1994 US dollars.

2001:Q4) temporarily differs from that in the pre-9/11 period, and, if $a_2 \neq 0$, there is a permanent shift in the intercept. If $\gamma \neq 0$, the slope of the trend in the post-9/11 period differs from that in the pre-9/11 period.[5] Hence, it could be claimed that 9/11 caused a permanent decline in either the intercept or the trend if the associated coefficients are negative and statistically different from zero. For y_t to be stationary in the presence of the structural breaks, it is necessary that $0 < | \rho | < 1$.

A few technical remarks are in order before we discuss the intervention analysis results. First, if the series is not stationary, it is then preferable to estimate the model using first-differences:

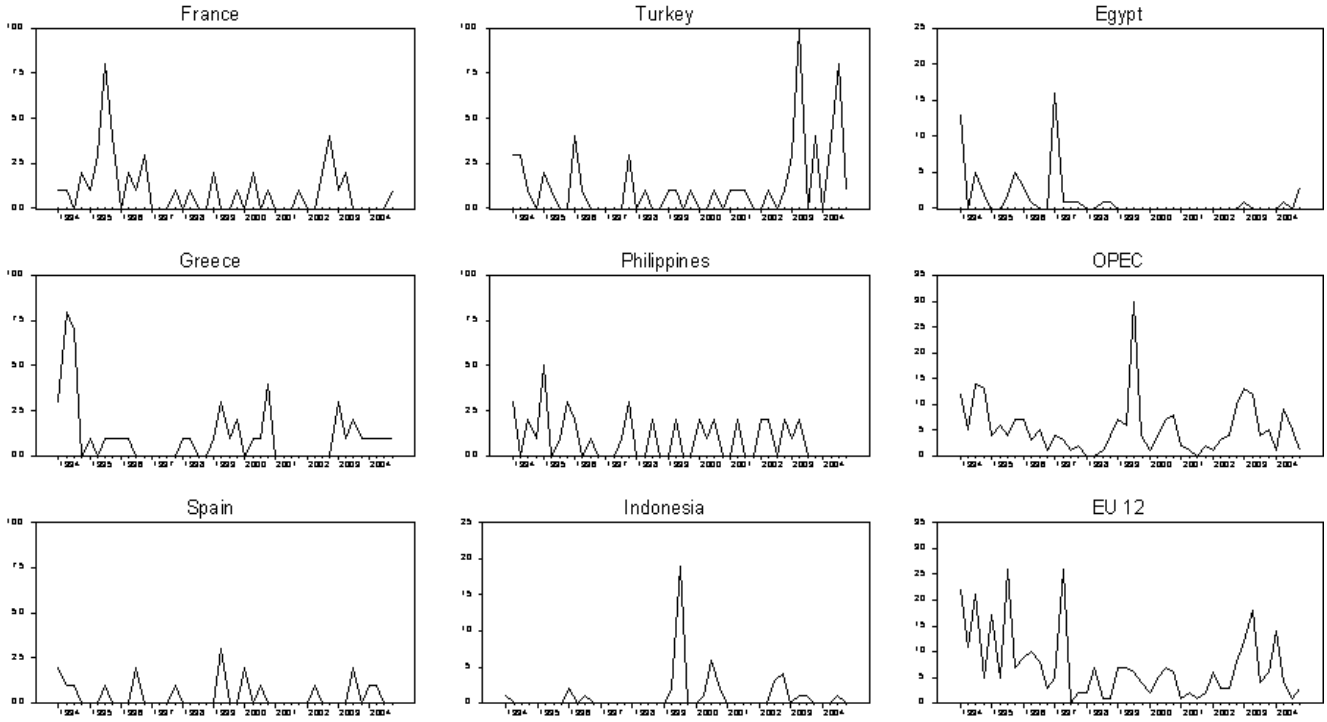
$$\Delta y_t = a_0 + a_1 \Delta D_p + a_2 \Delta D_L + \rho \Delta y_{t-1} + \varepsilon_t. \quad (2)$$

Second, to control for shifts in the overall level of U.S. FDI, we divide the amount of U.S. FDI in each country by the total level of worldwide U.S. FDI; hence, instead of representing the amount of U.S. FDI in a country, y_t stands for the country's share of U.S. FDI in period t. Third, the power of Perron's (1989) test can be improved when an unnecessary time trend is excluded from Equation (1). If the t-statistic for a_3 is not statistically different from zero, we perform the unit-root test constraining a_3 and γ to be zero. At the 5 percent significance level with 2001:Q4 as the break date, the critical value of the t-statistic for a unit root [i.e., $(\rho - 1) = 0$] is –4.18 in the presence of a trend, while it is –3.85 in the absence of a trend. Fourth, the residuals from Equation (1) must be serially uncorrelated. When there is any evidence of serially correlated residuals, we add lagged values of Δy_{t-i} ($i = 1, 2, \ldots$) to the regression equation until the serial correlation is eliminated.

For each country and region shown in Table 2, the sample value of the t-statistic for $(\rho = 1)$ is presented in column 2; the third column indicates whether the series is stationary or nonstationary [i.e., $I(0)$ or $I(1)$]. Nonstationary series are estimated using Equation (2). The remaining columns show the coefficient estimates with t-statistics in

[5] It is not possible to separately identify a temporary break in the level of a series and a temporary break in the slope.

FIGURE 3
U.S.-DIRECTED TERRORIST INCIDENTS (INCIDENTS PER QUARTER)



parentheses. If the columns for a_3 and γ are blank, trend is not included as a regressor. Turkey is the only country with a statistically negative coefficient for the pulse dummy (i.e., a_1). The more important issue is whether 9/11 had a permanent effect on U.S. FDI flows. In Table 2, the a_2 coefficient on D_L is negative and statistically significant for France, Saudi Arabia, Turkey, the OPEC countries, and Latin America. For France, Saudi Arabia, and Latin America, the statistically significant positive value for γ indicates that the trend of the series increased permanently following 9/11. A fall in the level of series when combined with an increased trend means that we cannot conclude that 9/11 resulted in a longer-term reduction in U.S. FDI flows for these countries. We can, however, characterize Turkey and the OPEC countries as displaying a small ongoing decline in U.S. FDI flows following 9/11.

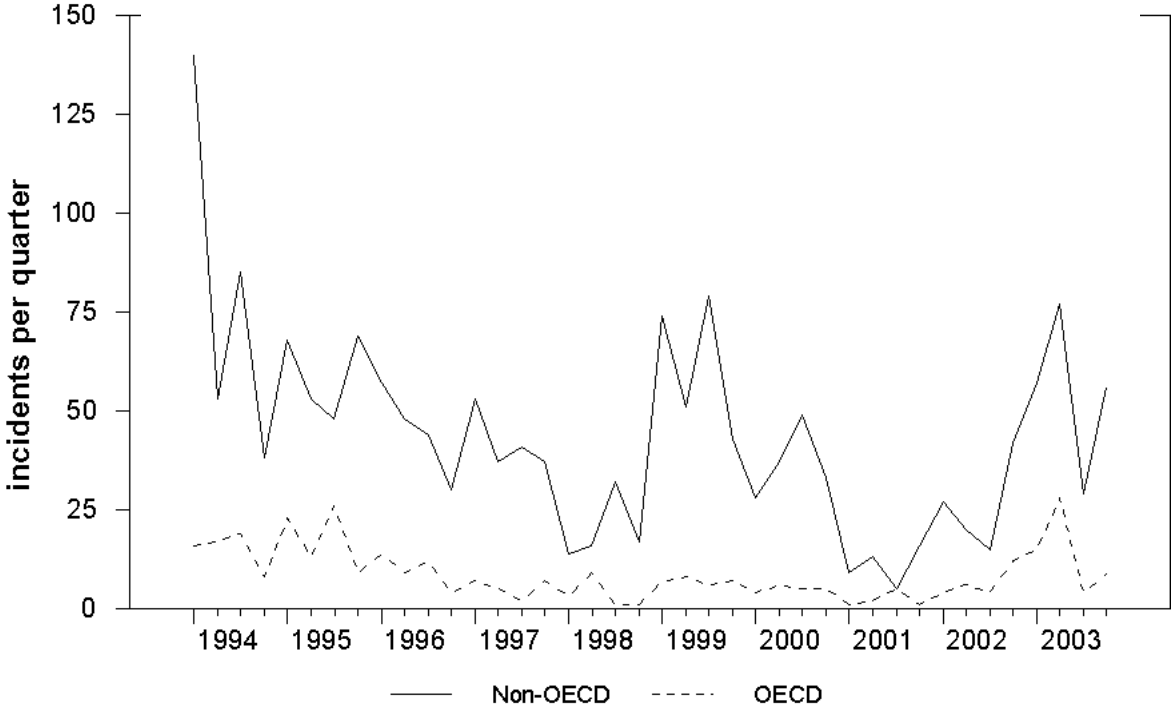
The point is that the time-series analysis reinforces the visual impression that 9/11 had little permanent effect on the composition of U.S. FDI flows. For most nations, the U.S. FDI series is unfortunately too short and too volatile to obtain any meaningful results concerning the influence of the individual terrorist incidents using transfer function methods. To address this concern, we next examine the impact of U.S.-directed transnational terrorist incidents on U.S. FDI using a panel of 69 countries, listed in the Appendix. This panel investigation allows us to control for a host of variables that may alter U.S. FDI decisions. For this new investigation, we can include all previous transnational terrorist attacks against U.S. interests, as described in the next section.

THE NEW TRADE THEORY AND FDI

The "new trade theory" arose to address some of the shortcomings of the standard 2-country, 2-good, 2-factor model of international trade. The essence of the standard 2 $\times$ 2 $\times$ 2 model is that countries will export (import) goods that use abundant (scarce) factors of production. However, the intuitive notion that the United States will export goods using large quantities of capital and import goods using large quantities of labor did not stand up to empirical testing. The so-called Leontief Paradox gave rise to an extensive research agenda that tried to explain why relative factor endowments did not properly predict trade patterns. The new trade theory makes clear that, in addition to factor endowments, the presence of economies of scale, multinational firms, and transport costs have an important role to play in determining trade patterns in a multiproduct-multicountry world.

The gravity model is now the standard in the empirical economics literature for analyzing bilateral trading relationships among nations because it is readily applied to a world of multinational firms in a multiproduct world. At the time of this writing, ECONLIT lists 98 entries with the term "Gravity Model" in the title and 348 with the term in the title or abstract. As applied to international trade relationships, the gravity model posits that the volume of trade between any two countries is positively related to their size and negatively related to the distance between them. Hence, large countries should trade more with one another after

FIGURE 4
OECD AND NON-OECD TERRORISM INCIDENTS



controlling for the distance separating them and other considerations. By combining the factor proportions model with the gravity model, it can be argued that U.S. trade with a particular country is expected to be negatively related to the distance between the two countries, positively related to country size, and positively related to the difference in factor endowments.

The situation is more complicated for analyzing U.S. FDI since trade and foreign direct investment can be substitutes or complements for one another. Clearly, a U.S. firm can choose to locate a plant abroad as a substitute for exporting to the foreign market. On the other hand, for a U.S. automaker, manufacturing many of its parts abroad, U.S. FDI occurs as a result of trade, thereby positing a complementarity. Therefore, some of the gravity model variables, which have unambiguous effect on the magnitude of bilateral trade, may result in either more or less U.S. FDI. For example, increased distance implies increased transport costs so that bilateral trade should be declining in the distance separating the two nations. However, one must not conclude that increased distance unambiguously reduces FDI as well (Egger and Pfaffermayr 2004). Increased distance raises the costs of conducting a multilateral enterprise, thereby limiting U.S. FDI. If, however, U.S. exports to country *X* fall with distance, then the potential benefits of locating U.S.-owned companies or subsidiaries in *X* is enhanced and this raises U.S. FDI. Thus, the effect of distance on FDI is ambiguous. Size, as measured by the sum of the two countries' GDP (S_{GDP}) is still a positive factor on U.S. FDI, since large economies present more profit potential. Often, an index of similarity of size [$Sim = 1 - (GDP_{us}/S_{GDP})^2 - (GDP_i/S_{GDP})^2$] is included to control for the possibility that the size effect is nonlinearly dependent on the sizes of the two nations. Since size similarity may encourage or discourage FDI, this term also has an ambiguous influence on U.S. FDI. When size similarity encourages FDI, the coefficient on *Sim* will be positive.

In contrast to the factor proportions theory, the effect of factor supplies on U.S. FDI may be ambiguous. Certainly, there is a rationale for U.S. firms to invest where capital is scarce and labor is abundant. The distinction between domestic and foreign firms is, however, blurred with globalization. In a multilateral world with unfettered capital mobility, the reasons that lead the foreigners to invest in their own country (e.g., profitability) can lead U.S. firms to invest there as well. Such investments by U.S. firms can help them to maintain market share in foreign markets by investing where market opportunities are promising. Hence, U.S. firms might invest in Germany, France, and the UK for precisely the same reasons that German, French, and UK firms invest at home. To the extent that there is really little difference between a U.S. and a foreign multinational firm, U.S. FDI might be large in those nations with relatively large capital stocks, such as many of the OECD countries.

Egger and Pfaffermayr (2004) used a gravity model to regress the *stock* of U.S. FDI on determinants that included the distance from the United States, size considerations, relative factor proportions, size similarity, and some interactive variables. Their estimation was conducted using seven manufacturing industries in 69 sample countries (see

TABLE 2
UNIT-ROOT TESTS AND STRUCTURAL-BREAK ANALYSIS

Region/Country	Unit Root *t*-test	Integration Order	a_0	a_1	a_2	a_3	γ
EU	–3.517	*I*(1)	0.083 (0.342)	–0.004 (–0.004)	1.796 (1.190)		
France	–5.077	*I*(0)	1.233** (4.688)	–0.065 (–0.233)	–3.651** (–2.904)	–0.020** (–2.500)	0.112** (3.204)
Greece	–6.424	*I*(0)	0.054** (5.138)	–0.010 (–0.490)	0.002 (0.195)		
Spain	–3.084	*I*(1)	0.035 (0.680)	0.024 (0.098)	–0.588 (–1.610)		
EASTERN EUROPE	–4.450	*I*(0)	–0.125 (–1.464)	0.077 (0.498)	–0.464 (–0.773)	0.017** (2.923)	0.013 (0.814)
WEST. HEMISPHERE	–3.477	*I*(1)	–0.038 (–0.232)	1.048 (1.435)	–1.915 (–1.843)		
Canada	–3.938	*I*(1)	0.084 (0.725)	–0.114 (–0.218)	–0.414 (–0.536)		
Mexico	–4.163	*I*(1)	0.025 (0.487)	0.759** (3.207)	0.028 (0.081)		
MIDDLE EAST							
Saudi Arabia	–4.810	*I*(0)	0.248** (4.255)	0.065 (1.047)	–0.944** (–3.450)	–0.006** (–3.043)	0.028** (3.714)
Egypt	–5.337	*I*(0)	0.152** (5.063)	0.003 (0.071)	0.004 (0.200)		
Israel	–6.547	*I*(0)	0.169** (5.501)	–0.142 (–1.852)	–0.048 (–1.412)		
Turkey	–4.563	*I*(0)	0.093** (5.449)	–0.131** (–3.492)	–0.081** (–3.723)		
OPEC	–3.832	*I*(1)	0.006 (0.109)	0.101 (0.422)	–0.803** (–2.445)		
PACIFIC	–2.046	*I*(1)	0.086 (0.506)	–0.790 (–1.025)	1.038 (0.956)		
China	–2.662	*I*(1)	0.020 (0.789)	0.442** (3.886)	0.193 (1.152)		
Indonesia	–3.250	*I*(1)	–0.012 (–0.608)	0.132 (1.433)	0.061 (0.467)		
Japan	–5.033	*I*(0)	1.329** (4.250)	–0.223 (–0.496)	0.694** (2.672)		
South Korea	–3.947	*I*(0)	0.344** (3.721)	0.070 (0.610)	0.043 (0.777)		
Malaysia	–3.325	*I*(1)	0.002 (0.061)	–0.044 (–0.321)	0.132 (0.687)		
Philippines	–6.694	*I*(0)	0.393** (6.068)	–0.003 (–0.050)	0.278 (1.420)	–0.007** (–4.136)	–0.004 (–0.777)
Singapore	–5.066	*I*(0)	0.953** (4.563)	–0.025 (–0.084)	1.001** (4.571)		
Taiwan	–4.945	*I*(0)	0.196** (3.522)	0.017 (0.255)	0.058 (0.226)	0.007** (2.918)	–0.005 (–0.658)
LATIN AMERICA	–4.203	*I*(0)	5.284** (4.235)	0.246 (0.394)	–12.275** (–3.807)	–0.100** (–3.394)	0.350** (3.884)
Brazil	–3.936	*I*(1)	–0.078 (–1.024)	0.125 (0.367)	–0.035 (–0.071)		

**Denotes statistical significance at the 1 percent level. *t*-statistics are in parentheses.

Appendix) for 1989-1999. The estimation included fixed effects and random effects (as embodied in the Hausman-Taylor specification) for industry-country effects. Although more recent data are available for a few of the countries, data spanning the post-9/11 period are not available for most sample countries. In our panel analysis of U.S. FDI, we must stay with the 1989-1999 period to extend their method to include U.S.-directed terrorist attacks as a determinant. Following other panel studies (Blomberg and Mody 2005; Egger and Pfaffermayr 2004), we use the stock of U.S. FDI as the dependent variable. After transforming the variance-covariance matrix to achieve homoskedastic errors, we estimate the model to achieve "within-type" residuals (including fixed effects) and apply the Hausman-Taylor method to remove any correlation between the regressors and the errors.[6] Based on Egger and Pfaffermayr's (2004) methods, the estimated equation (with *t*-statistics in parentheses) is:

$$\begin{aligned} FDI_{it} = {} & \underset{(8.72)}{5.222}S_{GDPit} + \underset{(4.56)}{1.531}Sim - \underset{(-3.86)}{15.036}K_{it}/K_{us} \\ & - \underset{(-2.54)}{0.282}H_{it}/H_{ust} + \underset{(3.35)}{13.387}L_{it}/L_{ust} + \underset{(4.64)}{13.640}Dist \\ & - \underset{(-3.99)}{1.822}(Dist)|k_{ust} - k_{it}| - \underset{(-3.12)}{0.025}S_{GDPit}|K_{it}/K_{ust}|, \end{aligned} \quad (3)$$

where FDI_{it} is the log of the stock of U.S. capital holdings in country *i*; S_{GDPit} is the sum of U.S. GDP and that of country *i* in period *t*; *Sim* is the size similarity measure between the United States and country *i*; K_i/K_{us} is the log of the capital stock in country *i* relative to that in the United States; H_i/H_{us} is the log of human capital in country *i* relative to that in the United States; L_i/L_{us} is the labor endowment in country *i* relative to that in the United States; *Dist* is the log of the distance between the United States and country *i*; k_{us} is the log of the U.S. capital-labor ratio; k_i is the log of *i*'s capital-labor ratio; and *t* is a time index. The remaining two composite terms in Equation (3) are interaction terms for distance and size, respectively.

Table 3 indicates the independent variables, their symbols, and their meanings. It also summarizes the anticipated effect on the stock of U.S. FDI. The interaction terms for distance and size allow for alternative outcomes. If, for example, the interaction between distance (or size) and differences in factor supplies limits the influence of distance (or size), then the interaction coefficient is negative. A case can also be made that the influence of distance (or size) may be enhanced when factor supplies differ greatly between countries. Hence, the signs of these interaction terms' coefficients are ambiguous as indicated in Table 3.[7]

Although these results are interesting, our goal is not to develop a model of U.S. FDI. Instead, our primary aim is to measure the effects of terrorism on U.S. FDI while controlling for the effects of other potentially important explanatory variables. To avoid the charge that we are ad hoc in our specification, we use an established model that can be easily modified to incorporate the possible influence of terrorism. Toward this end, we use the full sample of 69 countries for 1989-1999 and precisely the same specification and estimation methods as Egger and Pfaffermayr (2004). The main exception is that we include the number of terrorist incidents with a U.S. target that occurred in country *i* in period *t* as an explanatory variable. We also want to allow for the possibility that terrorism may have differential effect in high income countries or countries with established trade and capital linkages with the United States. Thus, we also run the Egger and Pfaffermayr (2004) specification splitting the sample of 69 countries into OECD nations and non-OECD nations. To measure U.S.-directed terrorist attacks, we extract three time series of increasing attack severity from ITERATE. The EVENTS series includes annual totals of all types of transnational terrorist incidents having a U.S. target. The CASUALTIES series consists of transnational terrorist incidents with a U.S. target where one or more individuals were injured or died, while the DEATH series consists of transnational terrorist incidents with a U.S. target where one or more individuals (including terrorists) died.[8]

As a first step, we estimate the model for *all* 69 countries, alternatively using the $EVENTS_{it}$, $CASUALTIES_{it}$, and $DEATH_{it}$ series as explanatory variables.[9] None of the measures of terrorism are significant at conventional levels in either the fixed-effects or the Hausman-Taylor random-effects specifications. Moreover, since none of the other coefficients changed in any qualitatively important ways, we conclude that *for the full sample of 69 countries* there is no measurable impact of terrorism on U.S. FDI. Part of the reason for the lack of significance may be due to the large degree of heterogeneity among the countries. For example, some nations have undergone large transnational terrorist campaigns while

[6] In a panel data estimation, the Hausman-Taylor method is necessary for capturing random effects when some of the independent variables display no time variation. For example, the distance from the United States (*Dist*) varies across nations but not over time. Thus, it is necessary to modify the usual fixed-effects estimator in order to separately capture the effects of *Dist*.

[7] The Egger-Pfaffermayr (2004) model is a general equilibrium model such that all relevant prices (including interest rates) are determined endogenously in the model. Hence, the factor supplies determine the equilibrium interest rate spread. If the stock of capital in one country is "too low," the marginal product of capital (the interest rate) in that nation would rise above the long-run equilibrium level. Capital accumulation would occur until the equilibrium spread was restored.

[8] Factors such as political risk, country risk, and corruption can influence the level of U.S. FDI in a nation. However, it is difficult to disentangle the separate influences of these factors from the influence of terrorism since all are likely to be correlated. To preview our main results, we find very little evidence of any influence of terrorism on the stock of U.S. FDI. Adding the additional measures of political instability is only likely to weaken the relationship between FDI and terrorism.

[9] The subscript *it* refers to country *i* and time period *t*; hence $EVENT_{it}$ is the number of transnational terrorist incidents with a U.S. target that occurred in country *i* in year *t*.

TABLE 3
INDEPENDENT VARIABLES AND THEIR INFLUENCES ON U.S. FDI

Independent Variable	Symbol	Meaning	Effect on U.S. FDI
Distance	*Dist*	Log of the distance from the United States	**Ambiguous**: Distance raises the transaction costs of multinational enterprises located abroad, thus limiting FDI benefits. However, distance also increases shipping costs, which favor operations abroad and the return on FDI.
Sum of bilateral GDPs	S_{GDP}	GDP_{us} + GDP_i	**Positive**: As GDP in the United States and a foreign market grows, there is a greater return to U.S. FDI.
Relative factor endowments	K_i/K_{us}, H_i/H_{us}, L_i/L_{us}	Log of a factor supply in country *i* relative to its log of supply in the United States	**Ambiguous**: Based on factor proportion models, U.S. firms invest in labor abundant and capital (human capital) scarce nations. Based on the new trade theory, the same influences that induce residents to invest in their country should also attract U.S. FDI.
Similarity	*Sim*	Index of similarity in country size: $1 - (GDP_{us}/S_{GDP})^2 - (GDP_i/S_{GDP})^2$	**Ambiguous**: Controls for the possibility that the size effect (S_{GDP}) is nonlinearly dependent on the relative sizes of the nations.
Size interactive term	$S_{GDP} \mid K_i/K_{us} \mid$	Product of S_{GDP} and relative capital endowments.	**Ambiguous**: Allows for positive or negative interaction between market size and relative capital endowments.
Distance interactive term	$(Dist) \mid k_{us} - k_i \mid$	Product of distance and absolute difference between capital-labor ratios.	**Ambiguous**: Allows for positive or negative interaction between distance and differences in capital labor ratios

others have experienced relatively little transnational terrorism (see Figure 3). Moreover, motivations for U.S. FDI in some nations are far different from those in other nations. By pooling very different terrorism influences on U.S. FDI, panel estimates are an average of individual country's effects that may not be very descriptive or significant if the sample is very heterogeneous. To control for the possibility that terrorism influences U.S. FDI in some nations but not others, we split the sample into OECD and non-OECD nations.

First, we consider the Egger-Pffaffermayr specification for the non-OECD nations in the absence of any terrorism measure:

$$FDI_{it} = \underset{(5.94)}{6.289}S_{GDPit} + \underset{(4.90)}{2.060}Sim - \underset{(-0.47)}{2.275}K_{it}/K_{ust} - \underset{(-3.71)}{0.591}H_{it}/H_{ust} + \underset{(0.16)}{0.785}L_{it}/L_{ust} + \underset{(0.57)}{1.683}Dist - \underset{(-0.60)}{0.332}(Dist)|k_{ust} - k_{it}| - \underset{(1.54)}{0.018}(S_{GDPit})|K_{it}/K_{ust}|. \quad (4)$$

Even though there are 1514 usable observations, many of the coefficients for this subset of countries are statistically insignificant. It is particularly interesting that all measures involving relative factor supplies, except human capital, are statistically insignificant. Nevertheless, two of the earlier established predictions from the gravity model remain in force; U.S. FDI stock in non-OECD nations is positively related to size (S_{GDPit}) and similarity (*Sim*).

Next, we estimate the model for the non-OECD countries, alternatively using the $EVENTS_{it}$, $CASUALTIES_{it}$ and $DEATH_{it}$ series as explanatory variables. As displayed in Table 4, none of the terrorism measures for U.S.-directed attacks are significant at conventional levels in either the fixed-effects or the Hausman-Taylor specifications. Nevertheless, the results in Table 4 are robust to the alternative terrorism specifications. It is difficult to believe that terrorist attacks directed against U.S. interests have no impact on the investment decisions of U.S. firms that consider whether to produce in places like Colombia or the Philippines. Once again, the heterogeneity of the sample may be behind this

TABLE 4
DETERMINANTS OF U.S. FDI FOR NON-OECD COUNTRIES (1989-1999)[a]

			EVENTS		CASUALTIES		DEATHS	
Independent Variables	Fixed Effects	Hausman-Taylor	Fixed Effects	Hausman-Taylor	Fixed Effects	Hausman-Taylor	Fixed Effects	Hausman-Taylor
Distance	—	1.683	—	–0.004	—	0.576	—	1.079
		(0.57)		(–0.01)		(0.22)		(0.70)
Interactive Distance Term	–0.457	–0.332	–0.438	–0.281	–0.462	–0.333	–0.463	–0.331
$(Dist)\lvert k_{ust} - k_{it}\rvert$	(–0.76)	(–0.60)	(–0.73)	(–0.51)	(–0.77)	(–0.60)	(–0.77)	(–0.60)
Sum of Bilateral	5.602*	6.289*	5.620*	6.329*	5.589*	6.281*	5.60*	6.285*
	(4.77)	(5.94)	(4.78)	(5.99)	(4.75)	(5.93)	(4.77)	(5.94)
GDP Interactive Term	–0.026*	–0.018	–0.026*	–0.018	–0.027*	–0.019	–0.027*	–0.019
$(S_{GDP})(K_{it}/K_{ust})$	(–2.01)	(–1.54)	(–2.02)	(–1.54)	(–2.02)	(–1.56)	(–2.02)	(–1.56)
Size Similarity	2.641*	2.060*	2.685*	2.084*	2.657*	2.057*	2.649*	2.063*
	(5.11)	(4.90)	(5.16)	(4.97)	(5.11)	(4.90)	(5.11)	(4.91)
Relative *K* Endowment	–3.146	–2.275	–2.987	–1.844	–3.187	–2.285	–3.195	–2.266
(K_{it}/K_{ust})	(–0.60)	(–0.47)	(–0.57)	(–0.38)	(–0.61)	(–0.47)	(–0.61)	(–0.47)
Relative *H* Endowment	–0.577*	–0.591*	–0.585*	–0.594*	–0.580*	–0.587*	–0.578*	–0.589*
H_{it}/H_{ust}	(–3.39)	(–3.71)	(–3.43)	(–3.72)	(–3.40)	(–3.68)	(–3.39)	(–3.70)
Relative *L* Endowment	0.338	0.785	0.151	0.522	0.392	0.941	0.391	0.853
L_{it}/L_{ust}	(0.06)	(0.16)	(0.23)	(0.11)	(0.07)	(0.19)	(0.07)	(0.17)
Terrorism Measure			0.002	0.002	0.007	0.005	0.007	0.007
			(0.68)	(0.55)	(0.28)	(0.24)	(0.22)	(0.22)
Prob-Value for Time Effects[b]			0.080	0.001	0.090	0.001	0.084	0.001
Durbin-Wu-Hausman Exogeneity Test[c]				0.0245		0.5799		0.5834
R^2	0.3768		0.3770		0.3768		0.3768	

[a]All regressions have 1514 observations and *t*-statistics are in parentheses. *denotes statistical significance at the 5 percent level.
[b]Entries are the significance of the sample value of the $F(10, 1097)$ statistic for the fixed effect model and the value of $\chi^2(11)$ for the Hausman-Taylor model.
[c]Entries are the prob-value of the sample value $F(1, 1096)$ statistic that the residuals of the terrorism equations are statistically significant in the FDI equation. At the 5 percent significance level, we cannot reject the null hypothesis that EVENTS is weakly exogenous.

absence of a terrorism impact, because the average picture captured in the panel's coefficients may not be descriptive of countries like the Philippines. It seems clear that terrorism explains only a small portion of the total variation in U.S. FDI across the broad spectrum of countries contained in the non-OECD sample.

The situation is quite different for the effects of terrorism in the OECD sample of countries. As shown in the third column of Table 5, the Egger-Pfaffermayr, Hausman-Taylor specification without any measures of terrorism gives:

$$FDI_{it} = \underset{(2.60)}{2.174}S_{GDPit} + \underset{(1.21)}{0.764}Sim + \underset{(2.49)}{29.106}K_{it}/K_{us} - \underset{(-0.73)}{0.105}H_{it}/H_{ust} - \underset{(-2.57)}{29.456}L_{it}/L_{ust} - \underset{(-0.95)}{6.899}Dist + \underset{(2.73)}{3.767}(Dist)\lvert k_{ust} - k_{it}\rvert - \underset{(-2.68)}{0.038}(S_{GDPit})\lvert K_{it}/K_{ust}\rvert. \quad (5)$$

As in all of our estimations, one of the key predictions of the gravity model holds in that bilateral country size (S_{GDPit}) is positive and statistically significant, which agrees with the belief that U.S. investments should be greatest in large countries. The size interaction term—though very small—is negative and statistically significant. As such, it slightly limits the size effect. Unlike the overall sample and the non-OECD case, the similarity measure (*Sim*) is not statistically significant. The likely explanation is that the overall variability of *Sim* is relatively small within the subset of OECD nations. Distance on its own is insignificant; however, since the distance interaction coefficient is positive and statistically significant, distance is important for countries with capital-labor ratios that differ from the U.S. ratio.

Perhaps, the most interesting result is that relative capital and labor endowments play an important role in the allocation of U.S. FDI. Notice that the coefficient on relative physical capital endowment (K_{it}/K_{ust}) in Equation (5) is

TABLE 5
DETERMINANTS OF U.S. FDI FOR OECD COUNTRIES (1989-1999)[a]

			EVENTS		CASUALTIES		DEATHS	
Independent Variables	Fixed Effects	Hausman-Taylor	Fixed Effects	Hausman-Taylor	Fixed Effects	Hausman-Taylor	Fixed Effects	Hausman-Taylor
Distance	—	–6.899	—	–11.080*	—	–10.893	—	–10.13
		(–0.95)		(–1.97)		(–1.90)		(–1.95)
Interactive Distance Term	3.246*	3.767*	3.269*	3.677*	3.198*	3.503*	3.291*	3.706*
$(Dist)\lvert k_{ust} - k_{it}\rvert$	(2.02)	(2.73)	(2.04)	(2.70)	(1.99)	(2.59)	(2.05)	(2.74)
Sum of Bilateral GDPs	2.064*	2.174*	2.257*	2.382*	2.079*	2.261*	2.012*	2.160*
	(2.25)	(2.60)	(2.45)	(2.84)	(2.27)	(2.70)	(2.19)	(2.58)
GDP Interactive Term	–0.035*	–0.038*	–0.035*	–0.041*	–0.034*	–0.040*	–0.035*	–0.040*
$(S_{GDP})(K_{it}/K_{ust})$	(–2.03)	(–2.68)	(–2.08)	(–2.84)	(–2.01)	(–2.76)	(–2.04)	(–2.80)
Size Similarity	0.815	0.764	0.891	0.800	0.847	0.758	0.837	0.752
	(1.21)	(1.21)	(1.32)	(1.26)	(1.25)	(1.19)	(1.24)	(1.18)
Relative *K* Endowment	24.312	29.106*	24.36	28.27*	23.80	26.85*	24.65	28.61*
(K_{it}/K_{ust})	(1.78)	(2.49)	(1.78)	(2.45)	(1.74)	(2.35)	(1.80)	(2.49)
Relative *H* Endowment	–0.116	–0.105	–0.162	–0.156	–0.133	–0.130	–0.125	–0.119
(H_{it}/H_{ust})	(–0.77)	(–0.73)	(–1.07)	(–1.06)	(–0.88)	(–0.89)	(–0.83)	(–0.82)
Relative *L* Endowment	–25.124	–29.456*	–25.48	–28.91*	–24.728	–27.40*	–25.57	–29.08*
(L_{it}/L_{ust})	(–1.92)	(–2.57)	(–1.95)	(–2.55)	(–1.89)	(–2.44)	(–1.95)	(–2.58)
Terrorism Measure			–0.017*	–0.016*	–0.066*	–0.062	–0.114*	–0.108*
			(–2.30)	(–2.27)	(–1.98)	(–1.93)	(–2.08)	(–2.06)
Prob-Value for Time Effects[b]			0.045	0.029	0.040	0.038	0.040	0.036
Durbin-Wu-Hausman Exogeneity Test[c]				0.3162		0.6960		0.7428
R^2	0.2600		0.2635		0.2626		0.2629	

[a]All regressions have 1253 observations and *t*-statistics are in parentheses. *denotes statistical significance at the 5 percent level.
[b]Entries are the significance of the sample value of the $F(10, 1097)$ statistic for the fixed effect model and the value of $\chi^2(11)$ for the Hausman-Taylor model.
[c]Entries are the prob-value of the sample value $F(1, 1096)$ statistic that the residuals of the terrorism equations are statistically significant in the FDI equation. At the 5 percent significance level, we cannot reject the null hypothesis that EVENTS is weakly exogenous.

almost the same (except for sign) as that of the relative labor endowment (L_{it}/L_{ust}). Since the variables are expressed in logarithms, the two expressions are approximately equal to $29.1(K_{it}/K_{ust} - L_{it}/L_{ust}) = 29.1(K_{it}/L_{it} - K_{ust}/L_{ust}) = 29.1(k_{it} - k_{ust})$. Thus, U.S. FDI stocks are increasing in the capital-labor ratio of the foreign nation relative to that of the U.S. This finding is consistent with multinational firms finding the best opportunity regardless of location, so that U.S. firms locate their production facilities in the same fashion as foreign firms. Thus, capital from domestic and foreign sources flows into the same areas. Unlike the non-OECD nations, the relative human capital endowment (H_{it}/H_{ust}) is not statistically significant. A possible explanation is that the variation in these ratios within the OECD nations is too small to detect a meaningful relationship. Another explanation is that U.S. multinational enterprise is able to bring along its own skilled personnel to other OECD nations so that local skills are not especially important for the FDI decision.

Because of the better prob-values for time effects, we focus our remarks on the Hausman-Taylor specifications in Table 5. For alternative specifications, the coefficients and their *t*-statistics are robust to the inclusion of the terrorism variable. The sole exception is the distance coefficient, which is negative and marginally significant at the 5 percent level for the EVENTS specification. For the other two terrorism specifications, distance is not quite significant at the 5 percent level. The other coefficients are near in value to those in Equation (5). The coefficients of interest in Table 5 are those for the three terrorism series. The $EVENT_{it}$ coefficient is negative with a significant *t*-statistics of –2.27. Within the set of OECD countries, we can *reject* the null hypothesis that U.S.-directed transnational terrorism does not have a negative effect on U.S. FDI stocks. To avoid the

critique that the variable "terrorism" is not exogenous in the FDI equation, we use the Durbin-Wu-Hausman test to verify the weak exogeneity of the terrorism variable. As shown in Table 5, the *prob*-value for the null hypothesis that terrorism is endogenous is 0.3162. We can, thus, conclude that the stock of FDI in country *i* in period *t* does not alter the contemporaneous amount of terrorism in that country.

Unlike the results of Blomberg, Hess, and Orphanides (2004), we find that greater violence in an incident has a larger impact on FDI. The interesting feature is that the absolute value of the coefficient on the DEATH series is larger than that on the CASUALTIES series which, in turn, is larger than that on the EVENTS series. Specifically, the coefficient on $EVENTS_{it}$ is –0.016, the coefficient for $CASUALTIES_{it}$ is –0.062, and the coefficient for $DEATH_{it}$ is –0.108. This is consistent with the notion that DEATH incidents have a larger impact on U.S. FDI than CASUALTIES incidents or incidents not resulting in death or injuries.

Next, we determine whether the impact of past terrorist actions on U.S. FDI is long-lasting. In order to measure the persistence of a terrorist incident on U.S. FDI, we modify our estimation equations to include both the current and past level of terrorism within a nation. In so doing, we find that lagged values of attacks are *not* statistically significant. This finding is easily understood. Forward-looking agents will be concerned about terrorist attacks in earlier periods only to the extent that past attacks are useful in predicting future attacks. Because almost all U.S.-target incident series for the individual countries are thin (i.e., contains few attacks), the past number of incidents within any OECD country has very little predictive power on the future number of incidents in that country. As such, the system has little memory in that past attacks are not likely to influence current and future U.S. FDI stocks.

We also use incidents with non-U.S. victims to allow for the possibility that terrorist attacks of any type can dissuade U.S. FDI. However, we find that only attacks targeting U.S. interests have effects large enough to be statistically significant.

The point estimates indicate that a typical U.S.-directed terrorist incident (i.e., EVENTS) in period *t* decreases the log of U.S. FDI by 0.016. Given that FDI_{it} is measured in millions of U.S. dollars, we can calculate the total impact on the stock of U.S. FDI of all terrorist attacks against U.S. interests for each sample country. If, for example, a country experiences three incidents in period *t*, the total impact on the stock of U.S. FDI of these incidents is a decrease of $3.048 million [≈ 3exp(0.016)]. Similarly, the point estimates of the loss of U.S. FDI associated with a typical U.S.-targeted terrorist incident involving casualties or death is a decrease of $1.063 million [≈ exp(0.062)] or $1.114 million [≈ exp(0.108)], respectively. Since terrorist acts are rather inexpensive (e.g., the 1993 bombing of the World Trade Center costs about $400), these losses per incident make terrorism cost-effective in achieving economic consequences.

Based on these per-incident calculations, we can compute the effects of U.S.-directed terrorism on U.S. FDI stocks for the entire 1989-1999 period. These calculations account for the number of incidents in each period. For all sample OECD nations except Greece and Turkey, the cumulative effect of terrorism on the stock of U.S. FDI is less than 1 percent of the total stock. This very small cumulative impact holds whether we use the EVENTS, CASUALTIES, or DEATHS series. For all U.S.-directed attacks, the cumulative effect is a loss of U.S. FDI stocks of 5.7 percent in Greece and 6.5 percent in Turkey for 1989-1999. These percentages translate into reduced stocks of $27.4 million in Greece and $39.4 million in Turkey. Thus, these smaller OECD countries suffered moderate economic consequences from U.S.-directed terrorist attacks. Quantification of these losses allows authorities to gauge better the benefits from capturing terrorists (e.g., 17 November Organization in Greece) and deploying effective counterterrorism measures.[10]

Implications and Conclusions

In this article, we employed two different statistical methodologies to gauge the impact that transnational terrorist incidents against U.S. interests have had on U.S. FDI. First, we applied time-series intervention analysis to ascertain whether 9/11 had long-term negative influences on U.S. FDI flows. Both regional and country-specific effects were displayed. Except for Turkey, there was no evidence that 9/11 had a lasting negative influence on U.S. FDI flows. This result is consistent with other findings that the consequences of 9/11 on global capital markets were short-lived (Chen and Siems 2004). Although 9/11 was a watershed event with huge immediate economic consequences (Enders and Sandler 2006), 9/11 only slightly interrupted the substantial growth in U.S. FDI flows in the current era of globalization.

Second, we employed panel estimation to quantify the impact that U.S.-oriented attacks abroad had on the stock of U.S. FDI. To control for other important economic variables (e.g., relative factor endowments and countries' GDP) that can affect capital flows, we applied the theoretical model and dataset of U.S. FDI put forward by Egger and Pfaffermayr (2004). Specifically, we estimated the determinants of the stock of U.S. FDI for 1989-1999 based on a panel of 69 countries, which consisted of 23 OECD countries and 46 non-OECD countries. Part of our innovation is to include terrorist attacks against U.S. interests in the set of explanatory variables. We uncovered a small, but significant, impact

[10] In an interesting study, Abadie and Gardeazabal (2003) examined the impact of Euskadi ta Askatasuna (ETA) terrorism on GDP per capita on the Basque province of Spain (1970-1997). These authors found that this terrorist campaign resulted in about a 10 percentage point drop in GDP per capita. This fall is greater than that implied by our study and can be easily explained. Basque Country is just one of 17 provinces in Spain. These authors' documented decline is *not* for all of Spain. According to Abadie and Gardeazabal (2003), investment drops in the Basque Country resulted in investment *gains elsewhere* in Spain. For all of Spain, the impact of ETA terrorism is probably in line with the modest decline found in our study.

of these attacks on the stock of U.S. FDI in the OECD countries. On average, each U.S.-directed incident reduced this stock by just over $1 million. For the entire sample period, these attacks lowered the stock of U.S. FDI by 1 percent. In Greece and Turkey, this stock fell by 5.7 percent and 6.5 percent, respectively. There was, however, no significant impact of such terrorist attacks on U.S. FDI in non-OECD countries.

These results have some interesting policy implications. First, they inform policymakers that the damage to U.S. investment interests are in OECD, rather than in non-OECD, nations. This intelligence indicates where countermeasures have the higher economic payback. Second, the quantification provided here can assist policymakers in knowing approximately how much to allocate to counterterrorist actions, since FDI losses provide a metric of the potential gain from stopping attacks. For example, actions that reduce attacks against U.S. interests by, say, three incidents save approximately $3 million on average in lost capital inflows from the United States. Third, because terrorist incidents are relatively inexpensive, our findings underscore that terrorism is very cost-effective for terrorists—they can cause far greater economic damage than the cost of the incident. Fourth, we showed that the economic fallout of transnational terrorism is still quite modest despite efforts by terrorists [e.g., Euskadi ta Askatasuna (ETA)] to use terrorism as a means to hurt economies. This is encouraging news that highlights the resilience of diversified economies. The downside is that attacks on small, less-diversified economies will be more damaging from an economic standpoint. This is consistent with the recent panel findings of Blomberg and Mody (2005) that the effect of transnational terrorism on FDI is more pronounced in developing countries. Thus, efforts by the United States to bolster counterterrorist actions are clearly needed in small developing countries where U.S. economic interests are great.

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APPENDIX

SAMPLE COUNTRIES (OECD countries are in italics)

Argentina	Honduras	Peru
Australia	Hong Kong	Philippines
Austria	Hungary	*Poland*
Brazil	*Iceland*	*Portugal*
Canada	India	Russia
Chile	Indonesia	Senegal
China	*Ireland*	Singapore
Colombia	Israel	Slovenia
Costa Rica	*Italy*	South Africa
Cote D'Ivoire	Jamaica	*Spain*
Czech Republic	*Japan*	Sri Lanka
Denmark	Kenya	*Sweden*
Dominican Republic	Malaysia	*Switzerland*
Ecuador	*Mexico*	Thailand
Egypt	Morocco	Trinidad and Tobago
El Salvador	*Netherlands*	Tunisia
Finland	*New Zealand*	*Turkey*
France	Nicaragua	*United Kingdom*
Gabon	Nigeria	Uruguay
Germany	*Norway*	Venezuela
Ghana	Pakistan	Zaire
Greece	Panama	Zambia
Guatemala	Paraguay	Zimbabwe

Note: The seven manufacturing industries are: food and kindred products; chemicals and allied products; primary and fabricated metals; industrial machinery and equipment; electronic and other electronic equipment; transportation equipment; and other manufacturing.