

Terrorism and the Labor Force: Evidence of an Effect on Female Labor Force Participation and the Labor Gender Gap

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Abstract

Recent studies have identified correlational associations linking terrorism and females' standing in the labor market. Theories have been proposed to explain these associations. Some concluded that women's participation in the labor force could be the driver that moves terrorism; others proposed that terrorism motivates the deviations in the labor force. No study has adequately explored causality and the direction of this association. Using a panel data set of 165 countries and terrorism data from 1980 to 2007, we find that terrorist attacks decrease female labor force participation and increase the gender gap between male and female labor force participation. By exploiting variation across countries and time, we are able to identify and quantify these effects; we are also able to address endogeneity concerns by using two novel instrumental variable approaches. The results are statistically significant and robust across a multitude of model specifications.

Keywords

conflict, natural disasters, national security, terrorism, labor, gender gap, conservatism

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A number of studies show a correlational relationship between measures of terrorism and the standing of women in the workforce as measured by female labor force participation. These studies have proposed various theories to explain the associations. Some conclude that women's participation in the labor force is the driver that moves terrorism; others propose theories where terrorism and conflict motivate the deviations in the labor force. No study has adequately explored causality and the direction of this association. Using a panel data set of 165 countries and terrorism data from 1980 to 2007, we find that terrorist attacks decrease female labor force participation and increase the gap between male and female labor force participation. By exploiting variation across countries and time, we are able to identify the effects of terrorism on female labor force participation and the labor gender gap. Furthermore, by using two novel instrumental variable approaches, we identify a causal link and address endogeneity concerns related to the possibility of transitional development and shifting gender relations inciting terrorism. We find that, on average, terrorist attacks decrease female labor force participation, ultimately widening the labor gender gap. The results are statistically significant and robust across a multitude of model specifications.

Exploratory studies over the last few decades sought to identify the various factors that influence terrorism or are influenced by terrorism.¹ In the broadest terms, these factors fall under economic, political, demographic, international, and geographic categories (Robison, Crenshaw, and Jenkins 2006; Krieger and Meierrieks 2011). It is crucial to ascertain the causal direction of any effects in the process of identifying those factors exhibiting significant statistical associations with terrorism. For example, in the case of economic conditions, knowing whether economic distress or poverty increases or decreases terrorism is often confounded by the question of whether terrorism affects economic conditions.² This same issue holds true for any other factors related to terrorism. Without a clear directional effect, economic theories, which seek to explain the association can remain only conjecture.

While exploring the possibility of modernization and social strain affecting levels of terrorist violence, several studies identified a relationship between terrorist activity and female labor force participation. Caprioli (2005) found evidence that gender inequality was associated with increased likelihood of a state experiencing internal conflict, the theory being that states characterized by gender discrimination and structural hierarchy exhibit patterns of violence making internal conflict more likely. Robison, Crenshaw, and Jenkins (2006) proposed that female labor force participation might influence terrorism, especially religious terrorism, as the freedom/liberation of women threatens groups where gender relations are viewed as divinely ordained. Contrasting the initial hypothesis, their study found that increased female labor force participation was negatively associated with Islamist attacks and had no effect on leftist terrorism. Robison (2010) proposed a revised hypothesis in line with previous results where women in public society exert a nonviolent influence that reduces terrorism.

While it is becoming clear that some relationship exists between terrorism and female labor force participation, no study has considered the possibility of an

endogenous relationship between terrorist attacks and female labor force participation, yet evidence and theory both indicate this possibility. It might seem strange at first to consider terrorism influencing female labor force participation on any significant scale; however, research into the gendered effects of violent conflict has a long history. The theoretical constructs of terror management theory (TMT) would suggest that individuals might turn inward or withdraw from the labor market in the face of a threat (Becker 1971, 1973). Following the September 11 attacks, Thomas (2003) found strong evidence that women desired to “nest” and connect with loved ones after the reality of the attacks set in. Competing theories of system justification theory (SJT) provide another possibility for flight from the female labor market. It states that populations tend toward a more conservative/traditionalist stance following a threat and could see a push toward upholding traditional gender roles in the workforce (Jost, Pelham, and Carvallob Mauricio 2002; Jost et al. 2003). Moreover, in a heightened threat environment, there could be increased anxiety toward leaving homes, children, or belongings unprotected. Females may assume these responsibilities and opt to stay at home to watch over the home and family.

In addition to the social psychology theories, economic theories support a negative effect from terrorism on female labor force participation through an effect on labor demand. Berrebi and Klor (2010) found that in Israel terrorism had a significant negative impact on nondefense-related companies while displaying a significantly positive effect on defense-related companies. The effects that terrorism had on these industries could manifest in female labor force participation if terrorism differentially affects industries that employ higher numbers of males over females or vice versa. If industries that suffer most from terrorism employ a larger share of women, women’s participation in the labor force may be more affected by a terrorist attack than may men’s. Additionally, if women occupy more precarious positions in industries negatively affected by terrorism, those jobs may be shed first during difficult times following an attack. In 2010, the UN World Tourism Organization reported that women make up a large proportion of the formal tourism workforce, specifically in service and clerical jobs within the industry, though they are poorly represented at the professional levels (Sinclair 1997; UN World Tourism Organization 2010). Many studies on the link between terrorism and tourism have documented a significant deleterious relationship between the two (Enders and Sandler 1991; Enders, Sandler, and Parise 1992; Pizam and Fleischer 2002; Sandler and Enders 2008; Thompson 2011). A negative effect of terrorism on industries with a disproportionate number of women workers or where women occupy unskilled and part-time positions could result in an increased labor gender gap. This contrasts the social psychology-based theories and would indicate the effect is grounded in the labor demand of those particular industries rather than the supply of female labor. Regardless of whether the effects are a result of changes in labor supply or demand, both theories provide a clear basis for a negative effect of terrorism on female labor force participation and justification for our initial hypothesis.

Hypothesis: Terrorist attacks exert a negative effect on female labor force participation and increase the gap between female and male labor force participation rates by influencing female labor supply and/or demand.

The objective of this study was first to explore the directionality of the observed association between female labor force participation and terrorism, second to identify and quantify the causal effect of terrorism on labor markets, and third to help establish the avenues through which terrorism might be affecting female labor force participation. By exploiting variation across countries and time, we are able to identify the direction of the relationship between terrorism, female labor force participation, and the labor gender gap. We find that, on average, terrorist attacks decrease female labor force participation, ultimately widening the labor gender gap. The results are statistically significant and robust across a multitude of model specifications. Furthermore, by using two novel instrumental variable approaches, we identify a causal link and address endogeneity concerns related to the possibility of transitional development and shifting gender relations inciting terrorism. Finally, by partitioning the data by terrorism type, the share of female labor-intensive industries, target types, and the severity of the attacks, we are able to more closely analyze the avenues through which terrorism affects female labor force participation and the labor gender gap. With this analysis, we provide stronger evidence that the effect is strongly influenced by economic conditions through an effect on the demand for labor in industries with a significant female presence. Our research clarifies the association observed seen between female labor force participation and terrorism and provides the first evidence of larger macroeconomic impacts of terrorism on disparities in the labor market.

Data

Our analysis utilizes a panel data set consisting of a total of 165 countries over the period of 1980 to 2007. The base specification consisted of 165 countries and 4,299 individual country-year observations.

Data on Labor, Demographic, Economic, and Social Indicators

Data on labor force participation outcomes and other demographic, labor, and economic covariates were obtained from the World Bank Development Indicators database (World Bank 2010). More specifically, the World Bank data on labor force participation by gender is based on the International Labour Organizations Key Indicators of the Labor Market data set (International Labour Organization [ILO] 2009). Data are available for labor force participation rates since 1980. This data set was designed to allow for consistent cross-country comparison of aggregated labor statistics by collecting information from all sources within ILO member countries while employing sophisticated techniques to adjust for differences in measurement

across countries and measures (Tarantino 2005). Indicators for civil liberties were obtained from the Freedom House: freedom in the World survey³ (Freedom House 2010; World Bank 2010). Data on internal conflict were obtained from the International Country Risk Guide (ICRG).

For other covariates, we included population size, urban population (percentage of total population), gross domestic product (GDP) per capita in constant 2000 US dollars, gross government final consumption expenditures (GFCE; percent of GDP), foreign direct investment (FDI; percentage of GDP), and total fertility rate (TFR). The covariates were chosen to best assess and control for a wide range of economic, demographic, labor market, and social characteristics, which the literature suggests might influence both female labor market participation and terrorism. In addition, we utilize either country-/year-fixed effects or first differencing to control for time-invariant differences between countries and country-invariant changes over time.

Besides our labor market outcomes, our other control variables are split into three categories: demographic, economic, and political. Within our demographic indicators, we controlled for population, as it is an important factor in terrorism risk assessments and larger populations are generally more likely to experience terrorist activity (Berrebi and Lakdawalla 2007). Urban population as a percentage of total population acts as a control for theories of social disorganization and strain and also because urbanization is often a factor associated with changing levels of female labor force participation (Jelin 1977; Bloom et al. 2009; Robison 2010). TFR is a measure of the number of births per 1,000 persons and is included as higher fertility rates are associated with lower levels of female labor force participation where populations have focused on child rearing over labor force participation. High fertility or birthrates put strain on countries, and increased competition for scarce resources, can also increase conflict and instability (Homer-Dixon 1994; Weiner and Russell 2001; Goldstone 2002; Urdal 2006).

For our economic controls, we include GDP per capita, as it is considered a good proxy for a number of development indicators, associated with higher levels of development, increased levels of female labor force participation, and declines in the labor gender gap (Oostendorp 2009; Duflo 2011). Conflict and civil war studies use it as a comprehensive approximation of a country's level of development (Hegre and Sambanis 2006; Nel and Righarts 2008). FDI (percentage of GDP) proxies as a measure of globalization. In addition, the level of foreign investment might be expected to correlate with both female labor force participation and terrorism, as increased investment in an economy could both transform opportunities for labor force participation and change incentives for terrorist groups (Neumayer and De Soysa 2011). Government final consumption expenditures substitutes as a measure of the size of the government, which has been linked to increases in female labor force participation and can act as a proxy for the degree of "government intrusiveness" into societal affairs (Robison et al. 2006; Cavalcanti and Tavares 2011).

Our political indicators include measures of political rights and civil liberties (Freedom House 2010). Political rights reflect freedom of political participation and

elections that are competitive. The civil liberties indicator measures the level of freedoms of speech, press, and association that have been found to be important in terrorism (Krueger and Malecková 2003; Krueger and Laitin 2008). Finally, terrorism against civilians and governments occurs during many internal conflicts and can be a tactic pursued by various groups and factions. It is for this reason that we added a variable for internal conflict from the International Country Risk Guide (ICRG; 2011) to control for some of the negative effects on women's employment due to the destruction wrought by major conflicts and not terrorist attacks. The internal conflict measure covers the years 1984 to 2007 in our data set and acts as an assessment of political violence in the country as well as its actual or potential impact on governance. It ranges on a scale of 0 to 12 with lower ratings given to countries where there is no armed or civil opposition to the government and the government does not indulge in arbitrary violence, direct or indirect, against its own people. Countries embroiled in an ongoing civil war are rated higher. The score is calculated as the sum of three subcomponents (Civil War, Political Violence, and Civil Disorder), each with a maximum score of four points and a minimum score of 0 points (PRS Group 2011).

Terrorism Data

Data for our terrorism measures are derived from the National Consortium for the Study of Terrorism and Responses to Terrorism (START GTD) Global Terrorism Database. The GTD contains information on target type, weapons used, date of attack, number of casualties, and location. The data are obtained primarily from contemporary news articles and other news sources. The GTD refrains from establishing a single definition of terrorism and instead includes coded criteria that cover a broad set of definitions of terrorism. For an event to be included in the database, it must first meet the three following base criteria (START 2010b):

- The incident had to be intentional—the result of a conscious calculation on the part of the perpetrator.
- It had to entail some level of violence or threat of violence—includes damage to property.
- The perpetrators of the incidents had to be subnational actors—does not include acts of state terrorism.

In order to further understand the terrorism phenomena and the various types of terrorism, Enders, Sandler, and Gaibullov (2011) established a method of decomposing the data within the GTD into transnational and domestic terrorist incidents. Using their methodology, transnational attacks are defined as those attacks in which victims, targets, perpetrators, or venues differ in nationality. Additionally, an incident is categorized as transnational if the terrorist/terrorists crosses international borders or targets an international organization or peacekeepers. Domestic terrorist incidents are those in which all of these characteristics share the same nationality.

They further restricted their data to require three additional criteria be present for an incident to be included:

- The act had to be aimed at attaining a political, economic, religious, or social goal. Exclusive pursuit of profit does not satisfy this criterion.
- There had to be evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) than the immediate victims.
- The action had to be outside the context of legitimate warfare activities.

This narrowed our acceptable set of attacks to approximately 66,000 terrorist incidents. Additionally, cases labeled as “doubted” were removed. These include incidents involving insurgency or guerilla warfare, internecine conflict, mass murder, and criminal acts. Brandt and Sandler (2010) first explored the important differences in terrorist target choice finding that, over time, terrorists have increased their targeting efforts against private and business targets versus government and military targets. As the various data sets were combined, data distinguishing the primary target of the attacks were maintained in order to assess whether effects might differ based upon the chosen targets of the terrorist group. The GTD uses a wide range of categories for target entities. In total, target types are broken down into twenty-two distinct groups. To ensure that an adequate number of events were included for statistical tests, the decision was made to aggregate some of the categories together to form two groups—government and private. The categories falling under the government group are government (general), police, military, and government (diplomatic). Private targets consist of attacks against businesses, abortion-related entities, airports and airlines, education centers and schools, food or water, journalists and media, maritime—civilian, nongovernment organizations, private citizens and property, religious figures and institutions, tourists, transportation, and utilities.⁴

Table 1 presents summary statistics of the observations within the data set. The average gap between male and female labor force participation rates over our time period is 27.1 percent, but can be as high as 74.7 percent. We included only countries with at least one terrorist attack; thus, on average, countries within the data set suffered 11.7 terrorist attacks per year. Interestingly, there is a large disparity in the average number of attacks between domestic and transnational terrorism. Within our data set, on average, countries suffer 1.8 transnational attacks per year; whereas, each year the average number of domestic terrorist attacks stands at 8.8. Overall, transnational attacks constitute less than one-fifth of all terrorist attacks.

Method

To assess the relationship between terrorism, female labor force participation, and the labor gender gap we estimate the models:

Table 1. Summary Statistics.

Measures by Country	Year	N	Mean	SD	Min	Max	P50	P5	P95
Female labor force participation rate		4,617	50.3	16.5	9.5	90.8	50.4	21.3	78.7
Labor gender gap		4,617	27.1	15.7	-3	74.7	24.2	4.1	56.3
# of terrorist attacks		4,617	11.7	46.3	0	727	0	0	56
# of nearby domestic terrorist attacks		4,617	38.7	91.9	0	1,032	6	0	194
# of domestic terrorist attacks		4,617	8.8	37.4	0	673	0	0	40
# of transnational terrorist attacks		4,617	1.8	6.6	0	135	0	0	9
# of attacks targeting private entities		4,617	7.7	31.8	0	485	0	0	37
# of attacks targeting government		4,617	3.9	15.6	0	262	0	0	17
Population size		4,614	3.30E + 07	1.20E + 08	143,000	1.30E + 09	7.30E + 06	288,000	1.20E + 08
Percent urban population		4,617	51.1	24	4.3	100	52.1	13.7	89.7
Total fertility rate (births per woman)		4,523	3.7	1.9	0.9	8.7	3.2	1.3	6.9
FDI (% of GDP)		3,865	3.9	20.6	-82.9	564.9	1.3	-0.2	10.8
GDP per Capita		4,125	5,970.3	8,716.2	62.2	56,624.7	1,715.7	179.4	25,130.2
GFCE (% of GDP)		3,957	16.2	6.9	1.4	76.2	15.3	7.2	28.4
Civil liberties		4,196	8.3	4	2	14	8	2	14
Internal conflict		2,931	3.3	2.7	0	12.0	2.8	0	8.8
Deaths from geophysical disasters		4,617	11.4	2,882.5	0	165,818	0	0	6
Deaths from meteorological disasters		4,617	61.5	2,082	0	138,987	0	0	53
Deaths from hydrological disasters		4,617	46.2	496.8	0	30,005	0	0	137
Deaths from climatological disasters		4,617	121.3	5,150.3	0	300,000	0	0	0
Incidence of geophysical disasters		4,617	0.2	0.6	0	11	0	0	1
Incidence of meteorological disasters		4,617	0.5	1.5	0	27	0	0	2
Incidence of hydrological disasters		4,617	0.7	1.5	0	21	0	0	3
Incidence of climatological disasters		4,617	0.1	0.5	0	9	0	0	1

Note: GFCE = government final consumption expenditures; GDP = gross domestic product; FDI = foreign direct investment.

Fixed Effects Model

$$\text{Labor_outcome}_{i,t} = \beta \times \text{Terrorism}_{i,t-j} + \alpha \times \text{Demographic}_{i,t} + \delta \times \text{Economic}_{i,t} + \theta \times \text{Social}_{i,t} + \rho \times \text{Year}_t + \varphi \times \text{Country}_i + \mu_{i,t}. \quad (1)$$

First Differenced Model

$$\Delta \text{Labor_outcome}_{i,t} = \beta \times \Delta \text{Terrorism}_{i,t-j} + \alpha \times \Delta \text{Demographic}_{i,t} + \delta \times \Delta \text{Economic}_{i,t} + \theta \times \Delta \text{Social}_{i,t} + \rho \times \Delta \text{Year}_t + \Delta \mu_{i,t}, \quad (2)$$

where:

$\text{Labor_outcome}_{i,t}$: Female labor force participation or the gap between male and female labor force participation in country i , year t .

$\text{Terrorism}_{i,t-j}$: Terrorism incidence in country i , year $t-j$ where j ranges from 0 to 2 (i.e., terrorist attacks in current year and up to two years lagged).⁵

$\text{Demographic}_{i,t}$: Population size, percentage of urban population, and TFR in country i , year t .

$\text{Economic}_{i,t}$: GDP per capita (constant 2000 USD), government final consumption expenditure GFCE (percentage of GDP), and FDI as a percentage of GDP in country i , year t .

$\text{Social}_{i,t}$: Civil liberties/political freedoms and internal conflict in country i , year t .

Year_t , country_i : Year- and country-fixed effects

$\Delta \text{Outcome}_{i,t}$: ($\text{Outcome}_{i,t} - \text{Outcome}_{i,t-1}$) or ($\text{Outcome}_{i,t-j} - \text{Outcome}_{i,t-j-1}$).

We estimate the effect of terrorism on female labor force participation using a panel data set of 165 countries over a period of twenty-seven years. Our specifications utilize a panel, ordinary least squares (OLS), framework with both country- and year-fixed effects or differencing, which mitigate many of the concerns for potential omitted variable bias. Country-fixed effects control for any country-specific variables that are time-invariant. Year-fixed effects control for any country-invariant factors such as global trends in labor force participation. Differencing serves the same purpose as country-fixed effects, eliminating country-specific, time-invariant factors, but has the additional benefit of alleviating concerns of serial correlation as well as focusing explicitly on the effects of a change in terrorism on changes in the female labor force participation rate.

As mentioned earlier, there is some concern regarding an endogenous relationship between terrorism and female labor force participation. One way to avoid the endogeneity issue is to utilize an instrumental variable approach in order to isolate terrorism's effect. What is necessary for such an approach is to find a variable strongly associated with levels of terrorism, but not associated with the female labor force participation rates or the labor gender gap. Seemingly simple, this turns out to be a difficult quest. In order to be valid, the instrumental variable must both be predictive of the endogenous regressor while maintaining its independence from the

error term of the dependent variable. This study implements two such instrumental variable approaches. First, we exploit an association between disasters and terrorist attacks in order to assess the causal direction of terrorism on our outcome. Berrebi and Ostwald (2011) painted a compelling picture of how natural disasters could create weaknesses in a government and society, which might incite terrorist groups to act thus increasing the incidence and severity of terrorism subsequent to a disaster. Their empirical results were robust and significant across a wide range of specifications of terrorism and disaster measures. We contend that after controlling for a few important population characteristics, natural disasters will be both correlated with terrorism and exogenous to the gap between male and female labor force participation. We estimate the model using a two-stage least squares (2SLS) estimator.

Data for natural disasters were obtained from the Center for the Research on the Epidemiology of Disasters' (CRED; 2010) Emergency Events Database (EM-DAT). EM-DAT has core data on both the occurrence and outcomes of over 17,000 disasters. The data have been compiled from a variety of sources including UN agencies, nongovernmental organizations, insurance companies, research institutes, and press agencies (CRED 2010). We used only geophysical, meteorological, hydrological, and climatological disasters, as there is a greater likelihood that the onset, prevalence, and outcomes of other disaster types such as industrial or technological accidents would be dependent on the types and capabilities of government and conditions within the country. The disaster types included in the natural disasters groups are Earthquake, Flood, Mass Movement Dry, Mass Movement Wet, Storm,⁶ Volcano, Extreme Temperatures, Droughts, and Wildfires.

The second approach utilizes lagged terrorism incidence in neighboring countries as an instrument for a country's level of terrorism. Empirical studies have shown that shocks to terrorism can influence levels of transnational and domestic terrorism in neighboring countries (Enders, Sandler, and Gaibullov 2011; Berrebi and Ostwald 2013). Data on country borders and distances were obtained from the bilateral distance file created by the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII; 2010). The data set contains bilateral data on countries including whether two countries share a border as well as their weighted distances based on city-level data of the geographic population distribution (2004) within a nation (Mayer and Zignago 2006). Using these data, lagged measures of domestic terrorist incidence in bordering countries were created for use as an instrument of a country's level of terrorist incidence. When a country did not share any borders, weighted distances were used to determine its nearest five neighbors and then similar measures of nearby domestic terrorism were created. The nearest five were chosen, at this cutoff, as the means and standard deviations were closest to those observed in the contiguous group.

Both methodologies assume there is exogeneity in our instruments and that after controlling for the previously-mentioned covariates, female labor force participation and the labor gender gap are affected by natural disaster or neighboring countries domestic terrorism only through their effect on the local country's terrorist attacks. In the case of natural disasters, the possibility of differential gender effects of

disasters on labor force participation rates could be a concern. Therefore, even though natural disasters have an inherent randomness, we must control for a number of population characteristics in order to obtain consistent estimates at both stages. Additionally, since we utilize multiple instruments for one endogenous regressor we are able to test our exogeneity assumption. Perhaps most convincingly, we utilize two different instruments allowing us to compare the results of both approaches and establish confidence in this assumption.

For our instrumental variable specifications we utilize the second and third lag of neighboring terrorism incidents or the second and third lag of the deaths and incidence of natural disasters broken down by disaster type.⁷ We control for time and individual country effects to account for inherent year shocks and fixed differences over time between countries. In addition, we included a variety of demographic control variables to better predict the true effect of natural disasters on terrorist attack incidence and deaths. These controls then must be included at both stages of the 2SLS and estimators. What follows are the specifications of our formal 2SLS instrumental variable model for the effect of terrorist attacks on the labor gender gap.

Second Stage:

$$\text{Labor_Gap}_{it} = \ln(\text{Terrorism_Measure}_{it-1})\alpha + \text{Pop_Char}'_{it} \rho + \text{Year}_t \beta_t + \text{Country}_i \lambda_i + \mu_{it}. \quad (3)$$

First Stage Disasters:

$$\begin{aligned} \text{Terrorism_Measure}_{it-1} = & \sum_{k=1}^3 \sum_{l=1}^3 (\ln(\text{Disaster_Deaths}_{i,j,t-k} \\ & + \text{Disaster_Counts}_{i,j,t-k})) \omega_{j,t-k} + \text{Pop_Char}'_{it} \rho \\ & + \text{Year}_t \beta_t + \text{Country}_i \lambda_i + \varepsilon_{it}. \end{aligned} \quad (4)$$

First Stage Neighboring Terrorism:

$$\begin{aligned} \text{Terrorism_Measure}_{it-1} = & \sum_{k=2}^3 (\ln(\text{Near_Terr}_{i,t-k})) \omega_{t-k} + \text{Pop_Char}'_{it} \rho + \text{Year}_t \beta_t \\ & + \text{Country}_i \lambda_i + \varepsilon_{it}. \end{aligned} \quad (5)$$

$\text{Disaster_Deaths}_{i,j,t}$ and $\text{Near_Terr}_{i,t-k}$ are our excluded instruments, i designates country, j designates disaster type (geophysical, meteorological, hydrological, and

climatological), and t designates year.⁸ Year- and country-fixed effects are designated as Year_t and Country_i , respectively, and $\text{Pop_Char}'$ is a vector of our labor, demographic, economic, and social freedom characteristics. In addition, we report standard errors that are robust for both arbitrary heteroscedasticity and arbitrary intragroup correlation.

Empirical Results

Table 2 reports the results of the effect of lagged terrorism incidence on the female labor force participation rate, as covariates are introduced into the fixed effects specifications. We lag terrorism incidence in order to better address endogeneity concerns. The first lag of terrorism incidence is significantly associated with lower levels of female labor force participation with a 99 percent statistical confidence level. We find that a one standard deviation increase in terrorism incidence⁹ correlates to a 0.07 reduction in the female labor force participation rate. This reduction is of sizable magnitude when considering the size of the work force, as for some countries this could amount to a considerable number of women leaving the labor market. For a more illustrative example, in 2010, the female labor force participation rate in the United States was 58.6 percent with an estimated 72 million women participating in the labor force (US Bureau of Labor Statistics 2011). A 0.07 reduction in the female labor force participation rate would amount to a loss of approximately 86,000 women from the labor force. In the other covariates, we find that GDP per capita is associated with higher levels of female labor force participation. This largely agrees with expectations given earlier research showing that more developed countries tend to have higher rates of female labor force participation. Increases in TFRs are similarly observed in an expected negative direction and associated with lower female labor force participation. Additionally, on average, countries with larger populations are associated with lower female labor force participation rates.

Given the close association between female labor force participation year to year, there is a possibility of serial correlation in the fixed effects models. To address this and in order to test the robustness of our findings, in Table 3, we implemented a first differenced model. This helps to isolate the duration of the effect and to address concerns of serial correlation. We reassessed for the presence of serial correlation using the Arellano and Bond (1991) test for AR(1) errors in our first-differenced model; results indicated that first differencing had adequately addressed any serial correlation. As before, we find that the change in the first lag of terrorism incidence is statistically significant and associated with a reduction in female labor force participation. In the other covariates, we find many of the same effects and statistical significance observed in the fixed effects specifications.

Table 4 contains our estimates of the effects of terrorism incidence on the labor gender gap. We define the labor gender gap as the difference between male and female labor force participation rates. It is important we test the effects on this measure as terrorism could negatively affect both male and female labor force participation,

Table 2. Panel OLS—Female Labor Force Participation Rate.

Models	(1)	(2)	(3)	(4)	(5)
Female labor force participation rate	b/se	b/se	b/se	b/se	b/se
Terrorist attacks	-0.004* (0.002)	-0.003* (0.002)	-0.003** (0.002)	-0.003 (0.002)	-0.004* (0.002)
Terrorist attacks (t - 1)	-0.004*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)	-0.002** (0.001)	-0.004*** (0.001)
Terrorist attacks (t - 2)	-0.004** (0.002)	-0.002* (0.001)	-0.002 (0.001)	-0.001 (0.001)	-0.002** (0.001)
Population size/IM			-0.016*** (0.006)	-0.018*** (0.006)	-0.022*** (0.007)
Population urban (% of total Population)			0.030 (0.064)	0.057 (0.071)	0.158* (0.086)
Total fertility rate (births per woman)			-0.714 (0.516)	-1.396*** (0.509)	-1.171* (0.614)
FDI (% of GDP)				-0.008 (0.005)	-0.004 (0.004)
GDP per Capita/IK				0.487*** (0.119)	0.474*** (0.138)
GFCE (% of GDP)				0.065* (0.036)	0.021 (0.045)
Civil liberties					0.015 (0.104)
Internal conflict					0.060 (0.093)
Year effects	No	Yes	Yes	Yes	Yes
Country effects	No	Yes	Yes	Yes	Yes
Obs	4,450	4,450	4,362	3,550	2,505
Number of countries	165	165	165	155	123
Log likelihood		-11,116	-10,852.5	-8,274.2	-5,523.6
AIC		22,291.9	21,771.0	16,620.4	11,115.2
BIC		22,484.0	21,981.6	16,842.7	11,313.3

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; FDI = foreign direct investment; GDP = gross domestic product; GFCE = government final consumption expenditures; Obs = observations. Reported standard errors are robust to clustering by country and arbitrary heteroscedasticity. Coefficients that have been scaled are indicated as such with their scaling factor. Significance level at which the null hypothesis is rejected: ***1 percent, **5 percent, *10 percent.

Table 3. Panel OLS—First Difference Female Labor Force Participation.

Models	(1)	(2)	(3)	(4)	(5)
First Difference Female Labor Force Participation	b/SE	b/SE	b/SE	b/SE	b/SE
ΔTerrorist attacks	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)
ΔTerrorist attacks (t - 1)	-0.001*** (0.001)	-0.001*** (0.001)	-0.001** (0.001)	-0.001** (0.001)	-0.002*** (0.001)
ΔTerrorist attacks (t - 2)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
ΔPopulation size/IM			-0.011** (0.005)	-0.010** (0.005)	-0.012* (0.006)
ΔPopulation urban (% of total population)			0.121* (0.062)	0.121* (0.064)	0.166** (0.068)
ΔTotal fertility rate (births per woman)			-0.332 (0.290)	-0.714** (0.350)	-0.323 (0.353)
ΔFDI (% of GDP)				0.000 (0.001)	0.001 (0.001)
ΔGDP per Capita/IK				0.292*** (0.072)	0.266*** (0.084)
ΔGFCE (% of GDP)				0.004 (0.004)	0.001 (0.006)
ΔCivil liberties					-0.010 (0.017)
ΔInternal conflict					-0.008 (0.021)
Year effects	No	Yes	Yes	Yes	Yes
Obs	4,299	4,299	4,149	3,334	2,344
Number of countries	165	165	165	154	123
Log likelihood	-4,870.9	-4,843.9	-4,690.4	-3,797.7	-2,643.5
AIC	9,749.9	9,747.9	9,446.8	7,667.5	5,355
BIC	9,775.3	9,938.9	9,655.7	7,887.5	5,550.9

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; FDI = foreign direct investment; GDP = gross domestic product; GFCE = government final consumption expenditures; Obs = observations. Reported standard errors are robust to clustering by country and arbitrary heteroscedasticity. Coefficients that have been scaled are indicated as such with their scaling factor. The symbol, Δ, before a covariate indicates that it was first differenced in the specification. Significance level at which the null hypothesis is rejected: ***1 percent. **5 percent. *10 percent.

Table 4. First Difference Labor Gender Gap.

Models	(1) b/SE	(2) b/SE	(3) b/SE	(4) b/SE	(5) b/SE
First difference labor gender gap					
ΔTerrorist attacks	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)
ΔTerrorist attacks (t - 1)	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)
ΔTerrorist attacks (t - 2)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
ΔPopulation size/IM			0.005 (0.004)	0.006 (0.004)	0.008*** (0.004)
ΔPopulation urban (% of total population)			0.027 (0.056)	0.003 (0.058)	0.001 (0.061)
ΔTotal fertility rate (births per woman)			0.361 (0.304)	0.711* (0.397)	0.233 (0.376)
ΔFDI (% of GDP)				0.000 (0.001)	0.000 (0.001)
ΔGDP per Capita/IK				-0.256*** (0.047)	-0.187*** (0.061)
ΔGFCE (% of GDP)				-0.004 (0.004)	-0.007 (0.007)
ΔCivil liberties					0.024 (0.018)
ΔInternal conflict					-0.005 (0.019)
Year effects	No	Yes	Yes	Yes	Yes
Obs	4,299	4,299	4,149	3,334	2,344
Number of countries	165	165	165	154	123
Log likelihood	-4,800.1	-4,778.3	-4,637.7	-3,827.1	-2,738.8
AIC	9,608.2	9,616.6	9,341.3	7,726.2	5,545.6
BIC	9,633.7	9,807.6	9,550.2	7,946.2	5,741.4

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; FDI = foreign direct investment; GDP = gross domestic product; GFCE = government final consumption expenditures; Obs = observations. Reported standard errors are robust to clustering by country and arbitrary heteroscedasticity. Coefficients that have been scaled are indicated as such with their scaling factor. The symbol, Δ, before a covariate indicates that it was first differenced in the specification.

Significance level at which the null hypothesis is rejected: ***1 percent, **5 percent, *10 percent.

which would indicate other pressures of terrorism on the labor market outside of factors directly related to female labor force participation. As the concern for serial correlation remains, we again implement a first differenced model. We find that, indeed, an increase in terrorist attacks is statistically associated with rising disparity between male and female labor force participation. A non-statistically significant finding would have indicated that terrorism was reducing both male and female labor force participation. Witnessing the gap widening is indicative of an effect primarily on female labor force participation.

Within our other variables, we find that higher GDP per capita is statistically associated with decreasing disparity in the labor gender gap and TFR increases with the labor gender gap. The fact that GDP per capita could be endogenous with the labor gender gap deserves some discussion. In particular, higher female participation in the labor force could contribute to a higher GDP per capita, or alternatively a higher GDP per capita could reflect the tendency of more developed economy to persuade females to substitute away from activities such as child rearing and into participating in the labor force. As a test, we excluded it from our models and found that the exclusion or inclusion of GDP per capita changed neither the coefficient direction nor the statistical significance of our lagged terrorism measure.¹⁰

Within the first differenced models, we find that GDP per capita is associated with increases in female labor force participation rates and reductions in the labor gender gap. Holding all other measures constant, increases in population size and fertility rate are associated with lower female labor force participation. All results indicate that terrorist attacks lower subsequent female labor force participation and increase the labor gender gap; however, this robust association is not enough to establish the full case for a causal effect. To reinforce the causal argument for an effect, we instead implement two novel instrumental variable approaches using natural disasters' effect on terrorism as first reported in Berrebi and Ostwald (2011) as well as lagged terrorism in neighboring countries. As a further precaution to ensure exogeneity, and because the earlier results indicated an effect concentrated primarily in the first lag, we use only the first lag of terrorism incidence. Table 5 depicts the results of this analysis.

Perhaps most reassuring is the similarity between the resulting magnitude and standard errors of terrorist attacks across both instrumental variable approaches.¹¹ Once again, we find statistically significant effects of terrorism on female labor force participation rates. Specifically, we find that terrorist attack incidence decreases female labor force participation and increases the labor gender gap. The terrorism measure was transformed using the natural log as modeling the IV first stage as a nonlinear count model presented a host of challenges for coefficient interpretation and error estimation; thus, the interpretation of these results differs slightly from previous model specifications. For the first specification, a 10 percent increase in terrorism is associated with a .189 percentage point reduction in female labor force participation.¹² Using our earlier example of the 2010 female labor force participation rate in the United States, a .189 percent reduction in the labor force participation

Table 5. Instrumental Variable Approach.

Outcome	Female LFPR		Gender Labor Gap	
	Natural disasters b/SE	Near domestic terrorism b/SE	Natural disasters b/SE	Near domestic terrorism b/SE
Terrorist attacks ($t - 1$)	-1.992*** (0.656)	-2.077*** (0.718)	1.292** (0.603)	1.661** (0.721)
Population size/IM	-0.011 (0.008)	-0.010 (0.007)	0.010 (0.006)	0.008 (0.006)
Population urban (% of total population)	0.129 (0.088)	0.128 (0.086)	-0.019 (0.084)	-0.015 (0.082)
Total fertility rate (births/woman)	-1.805** (0.737)	-1.835** (0.787)	1.298** (0.640)	1.428** (0.709)
FDI (% of GDP)	0.001 (0.005)	0.001 (0.005)	-0.002 (0.004)	-0.003 (0.004)
GDP per Capita/IK	0.425*** (0.137)	0.423*** (0.136)	-0.410*** (0.121)	-0.403*** (0.118)
GFCE (% of GDP)	0.020 (0.056)	0.020 (0.057)	-0.074 (0.058)	-0.073 (0.061)
Civil liberties	0.009 (0.096)	0.009 (0.096)	0.126 (0.095)	0.128 (0.094)
Internal conflict	0.426** (0.168)	0.444** (0.198)	-0.236 (0.160)	-0.316 (0.192)
Year effects	Yes	Yes	Yes	Yes
Fixed effects (country)	Yes	Yes	Yes	Yes
Obs	2,505	2,505	2,505	2,505
Number of countries	123	123	123	123
Log likelihood	-5,909.9	-5,942.9	-5,544.4	-5,658.6
AIC	11,883.8	11,949.9	11,152.8	11,381.2
BIC	12,070.2	12,136.3	11,339.2	11,567.7

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; FDI = foreign direct investment; GDP = gross domestic product; GFCE = government final consumption expenditures; LFPR = labor force participation rate; Obs = observations. Reported standard errors are robust to clustering by country and arbitrary heteroscedasticity. Coefficients that have been scaled are indicated as such with their scaling factor. Significance level at which the null hypothesis is rejected: ***1%, **5%, *10%.

rates would amount to approximately 134,000 women leaving the labor force out of the estimated 72 million women participating (US Bureau of Labor Statistics 2011). Other covariates display similar results to the findings of earlier specifications. In particular, GDP per capita is associated with increases in female labor force participation and a smaller labor gender gap while a higher total fertility is associated with lower female labor force participation and a larger labor gender gap.

We report both the effects on female labor force participation as well as the gap between male and female labor force participation, as there could be reason to question the validity of certain instruments when labor force participation is considered separately. Specifically, natural disasters can have a large impact on an economy. Recovery efforts might create more jobs and increase labor force participation, or a loss of infrastructure could force a portion of the population out of work. Using the gender labor gap, the assumption is no longer that natural disasters have no effect on female labor force participation, but rather natural disasters do not exert a differential effect between male and female labor force participation. We control for many other factors that might influence the two or act as mediators; however, there could potentially still be reason to believe that disasters induce dissimilar effects on labor force participation between men and women. The use of a second instrument, lagged terrorism in nearby countries, helps to assuage these concerns and the association of one country's level of terrorism to its neighbors' is quite significant (Enders, Sandler, and Gaibullov 2011; Berrebi and Ostwald 2013). The similarity between the results for the two, very different, IV approaches further supports the causal relationship.

In general, our findings indicate that terrorist threats to a society increase gender inequalities in the labor market. While terrorism is the root shock negatively affecting female labor force participation, what remains to be explored is the mechanism through which terrorism is affecting female labor force participation and whether it is an effect on supply or demand for labor. We begin by exploring the targets and types of terrorist attacks to search for differential effects, which might indicate any key characteristics guiding this effect.

Transnational attacks or attacks on civilians may impact the resulting shifts in labor force participation differently than domestic attacks or attacks against the government. For instance, Gaibullov and Sandler (2008) found that transnational terrorism has a greater negative impact on economic growth than domestic terrorism. Oftentimes, women who in many countries take up a greater share of unskilled and part-time work suffer most during economic downturns and are more likely to lose their jobs. If the relationship between terrorism and female labor force participation is primarily the result of an economic demand impact, we might expect to see transnational attacks have a larger negative impact on female labor force participation. We explore this by conducting our analysis of the first differenced specifications after dividing the attacks based on the type of terrorism, transnational versus domestic.

Table 6 illustrates the effects of terrorist attacks on female labor force participation and the labor gender gap in the first differenced models as partitioned by

terrorist type—domestic versus transnational. The larger coefficient for transnational attacks is particularly notable due to the significantly smaller incidence of transnational attacks compared to domestic incidents. The similar statistical significance and larger magnitude indicates a larger impact of transnational attacks on female labor force participation than domestic attack. As transnational terrorism has been linked to greater negative economic impacts than domestic terrorism has been, the larger effect size supports the possibility of an economic impact of terrorism on the demand for female labor force participation. While the effect size of transnational terrorism is larger, the statistical significance remains for both transnational and domestic attacks, which suggests that the phenomenon is not necessarily the result of a single “type” of terrorist attack. This, in turn, supports the robustness of our overall findings.

As discussed earlier, the effects that terrorism has on particular industries could affect the labor gender gap if terrorism differentially affects industries that employ a disproportionate number of males over females or vice versa. If industries that are negatively affected by terrorism employ a larger share of women, female participation in the labor force may be more sensitive to terrorism in comparison to male labor force participation. Similarly, if women occupy more precarious positions in those businesses, they may shed those jobs first during difficult times following an attack. Women often make up a large proportion of the formal tourism workforce, specifically occupying service and clerical jobs within the tourist industry (Sinclair 1997; UN World Tourism Organization 2010). Often their experience in domestic roles translates to relatively “unskilled” work, and occupations in tourism often draw heavily on the traditional domestic skill set of women (Sinclair 1997). Research exploring terrorism and tourism has documented a significant negative effect of terrorist attacks on tourism (Enders and Sandler 1991; Enders, Crenshaw, and Jenkins 1992; Fleischer and Buccola 2002; Sandler and Enders 2008; Thompson 2011). For that reason, we partitioned our data into two groups based on their average level of international tourism as a percentage of their total exports and explored terrorism’s effects between the two groups.¹³ Tying these different areas of research together, if the effect on female labor force participation is mainly driven by an economic shock to female labor-intensive industries, we should expect to see significantly larger effect sizes for countries that rely more heavily on tourism. Table 7 depicts our analysis of the first difference models for both female labor force participation and the labor gender gap after splitting our countries into high tourism and low tourism-based groups.

As hypothesized, results were significantly greater, six times, in countries that rely more heavily on tourism. In high tourism countries, a standard deviation change in terrorism would amount to a .2 percentage point decrease in female labor force participation and an equally large increase in the labor gender gap. Considering tourism is an industry with higher female labor participation as compared to other industries, the observed effect on countries’ total female labor force participation implies a much larger percentage of job losses for women in the tourism sector. Combined

Table 6. First Difference—Female FLFP and Gender Labor Gap by Terrorism Type.

Outcome	Female FLFP		Gender Labor Gap	
	Domestic b/SE	Transnational b/SE	Domestic b/SE	Transnational b/SE
Δ Terrorist attacks	-0.001 (0.001)	-0.003 (0.002)	0.001 (0.001)	0.003 (0.002)
Δ Terrorist attacks ($t - 1$)	-0.003** (0.001)	-0.005** (0.002)	0.003*** (0.001)	0.006** (0.003)
Δ Terrorist attacks ($t - 2$)	-0.001 (0.001)	-0.003 (0.004)	0.001 (0.001)	0.003 (0.003)
Δ Population size/IM	-0.012* (0.006)	-0.012** (0.006)	0.008* (0.004)	0.008** (0.004)
Δ Population urban (% of total population)	0.166** (0.068)	0.167** (0.068)	0.001 (0.061)	0.000 (0.062)
Δ Total fertility rate (births per woman)	-0.321 (0.353)	-0.300 (0.352)	0.230 (0.376)	0.211 (0.376)
Δ FDI (% of GDP)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Δ GDP per Capita/IK	0.266*** (0.084)	0.263*** (0.084)	-0.187*** (0.060)	-0.184*** (0.061)
Δ GFCE (% of GDP)	0.001 (0.006)	0.001 (0.006)	-0.007 (0.007)	-0.006 (0.007)
Δ Civil liberties	-0.010 (0.017)	-0.009 (0.018)	0.024 (0.018)	0.023 (0.019)
Δ Internal conflict	-0.008 (0.021)	-0.015 (0.020)	-0.004 (0.019)	0.004 (0.020)
Year effects	Yes	Yes	Yes	Yes
Obs	2,344	2,344	2,344	2,344
Number of countries	123	123	123	123
Log likelihood	-2,643.8	-2,652.3	-2,738.8	-2,748.8
AIC	5,355.7	5,372.5	5,545.7	5,565.5
BIC	5,551.5	5,568.4	5,741.5	5,761.3

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; FDI = foreign direct investment; GDP = gross domestic product; GFCE = government final consumption expenditures; LFP = labor force participation rate; Obs = observations. Reported standard errors are robust to clustering by country and arbitrary heteroscedasticity. Coefficients that have been scaled are indicated as such with their scaling factor. The symbol, Δ , before a covariate indicates that it was first differenced in the specification.

Significance level at which the null hypothesis is rejected: ***1 percent. **5 percent. *10 percent.

Table 7. First Difference—Female FLFP and Gender Labor Gap by International Tourism (percentage of total exports).

Models: First Difference	Female LFPR		Labor Gender Gap	
	Low tourism b/SE	High tourism b/SE	Low tourism b/SE	High tourism b/SE
ΔTerrorist attacks	-0.001*** (0.000)	0.000 (0.002)	0.001 (0.001)	0.000 (0.002)
ΔTerrorist attacks (t - 1)	-0.001*** (0.000)	-0.006*** (0.002)	0.001* (0.001)	0.006*** (0.001)
ΔTerrorist attacks (t - 2)	0.000 (0.000)	-0.001 (0.001)	0.000 (0.000)	0.002 (0.001)
ΔPopulation size/IM	-0.013** (0.006)	-0.051 (0.059)	0.008* (0.004)	0.069 (0.055)
ΔPopulation urban (% of total population)	0.170* (0.091)	0.160 (0.100)	0.019 (0.086)	-0.021 (0.084)
ΔTotal fertility rate (births per woman)	-0.290 (0.470)	-0.436 (0.551)	0.048 (0.446)	0.592 (0.591)
ΔFDI (% of GDP)	0.000 (0.001)	-0.001 (0.002)	0.000 (0.000)	0.003 (0.003)
ΔGDP per Capita/IK	0.266*** (0.089)	0.235 (0.194)	-0.140** (0.064)	-0.302* (0.181)
ΔGFCE (% of GDP)	-0.004 (0.006)	0.007 (0.011)	0.007 (0.008)	-0.022** (0.009)
ΔCivil liberties	-0.016 (0.021)	-0.009 (0.025)	0.019 (0.024)	0.038 (0.026)
ΔInternal conflict	-0.007 (0.029)	-0.017 (0.024)	-0.006 (0.030)	0.001 (0.022)
Year effects	Yes	Yes	Yes	Yes
Fixed effects (country)	No	No	No	No
Obs	1,239	1,105	1,239	1,105
Number of countries	66	57	66	57
Log likelihood	-1,360.2	-1,248.9	-1,532	-1,164.2
AIC	2,788.4	2,565.9	3,132	2,396.3
BIC	2,962.5	2,736.1	3,306.2	2,566.6

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; FDI = foreign direct investment; GDP = gross domestic product; GFCE = government final consumption expenditures; LFPR = labor force participation rate; Obs = observations. Reported standard errors are robust to clustering by country and arbitrary heteroscedasticity. Coefficients that have been scaled are indicated as such with their scaling factor. The symbol, Δ, before a covariate indicates that it was first differenced in the specification.

Significance level at which the null hypothesis is rejected: ***1 percent. **5 percent. *10 percent.

with previous research and the differences in effect for transnational terrorism versus domestic terrorism, these results help strengthen the evidence that the effect on female labor force participation is entwined with a reduction in demand for labor in female labor-oriented industries rather than an effect on women's choice to leave

the labor market which would reduce labor supply. It is important to remember that while this lends confidence to the theories related to demand for labor, we still find statistically significant results in both high and low tourism countries and for both domestic and transnational attacks, which implies that the terrorism's effect on tourism does not account for the entirety its effect on female labor force participation and an effect through female labor supply decisions might jointly exist.

As an additional check, we split attacks based on target type—government or private in order to test whether target choice played a part in the observed relationship. Table S1 in the Online Appendix displays the results of our first difference analysis of the effects of terrorist attacks on female labor force participation and the labor gender gap with attacks differentiated by their primary target.¹⁴ Interestingly, we find the largest coefficient magnitudes for attacks against government rather than private entities. An increase in terrorist attacks remains statistically associated with a following decrease in female labor force participation and a similarly sized increase in the labor gender gap; however, attacks against the government are associated with larger magnitude changes in the outcomes.

Attacks against governments make up a smaller percentage of attacks as compared to attacks against private targets. As terrorism has evolved, terrorist groups have increased attacks against easier targets, choosing private targets that are typically less defended than “hardened” military or government targets (Brandt and Sandler 2010). The greater effect size observed could occur if attacks against governments have a larger destabilizing effect on a government and investor risk resulting in larger economic and ultimately labor force impacts. Additionally, an attack against a government target suggests a more capable terrorist group and could draw increased media attention and legitimacy for its success. Countries with more frequent attacks against the government suggest a weakened state where groups can have a more lasting impact on economic conditions, as investors reconsider the state's security capacity in the face more capable opposition forces.

Another interesting question is whether the effect on the female labor force is disproportionately driven by massive, high-casualty attacks or by small-scale attacks associated with longer terror campaigns. Initial expectations lean toward the notion that countries with high-casualty terrorism may experience a larger impact of terrorism on female labor force participation. Media often focuses on mass casualty terrorism and this coverage could instill greater fear into a population with larger resultant effects on labor choices. Partitioning the data by high and low deaths per attack allows us to investigate whether the effect on the female labor force is more evident for those countries with greater terrorism severity. Table S2 in the Online Appendix demonstrates this analysis by partitioning countries by high and low average deaths per attack. We separated the data by taking the average of the log of deaths per attack for each country and then splitting the countries into two groups at the median of 0.504 log deaths per attack. Interestingly, the results showed comparable effects on female labor force participation and the labor gender gap for both low and high terrorism severity countries, which indicates severity plays less of a part in the observed relationship between terrorism and female labor force participation than

initially hypothesized. If linked to an effect through industries with high female labor force participation, these results are in agreement with previous research, particularly Pizam and Fleischer (2002), who found that a larger decline in international tourist arrivals in Israel could be attributed to the frequency of acts of terrorism rather than the severity of the acts. They found that more consistent terrorism, whether of high or low severity, had a larger effect on tourism demand than rare but high-casualty events.

At first glance, it may seem strange that the severity of terrorism does not play a significant role; however, the assumption that deaths per attack are more influential than the frequency of attacks would imply that a single large attack should have a greater impact than a constant campaign of less lethal but consistent attacks. While massive attacks result in higher media coverage, more frequent small-scale attacks may have more lasting impacts on long-term labor and hiring choices. More attacks, regardless of lethality, expose a higher percentage of the population to the stress and anxiety of attacks, which they would incorporate into their choices. Kidnappings and singular assassinations of key government personnel, if carried out consistently and successfully, could terrorize a population more effectively than a single but rare high-casualty event. Since labor force choices are long-term decisions, it makes sense that a woman who is expecting herself or her family to be exposed to a consistent threat of terrorism might further reduce her exposure (stay home) versus a woman who hears about a single mass casualty attack. Similarly, industries affected by terrorism may quickly return to business as usual if further attacks are not expected; however, they may stop hiring or reduce their current labor if attacks are expected to continue for a long time.

Conclusion

This study set out to expand upon a growing body of literature documenting a relationship between terrorist attacks and female labor force participation by exploring and clarifying the associations between the two. Our findings confirm our hypothesis and show that increases in terrorist attacks decrease female labor force participation and increase the labor gender gap. Results were statistically significant, of sizable magnitude and robust across a multitude of specifications. In order to establish causality, we used panel data that exhibit both spatial and temporal variation in both fixed effects and first difference settings. To further avoid endogeneity concerns, we utilized multiple instrumental variable approaches for a stronger argument of a causal effect. Finally, the analysis resolves many disparities between the empirical results and previous theories on the link between female labor force participation and terrorism.

By partitioning terrorist attacks by terrorism type and target, we found statistically significant effects apparent for both transnational and domestic terrorist attacks against both government and private targets; however, we observe greater effect sizes associated with transnational attacks and those perpetrated against government entities. Previous research has found transnational terrorism to have larger economic impacts (Gaibulloev and Sandler 2008). This suggested a possible relationship between our observed effects and direct economic impacts in industries with higher levels of

female labor force participation. We investigated this by framing the analysis around tourism where women often make up a larger proportion of the formal workforce, specifically in service and clerical jobs within the industry (Sinclair 1997; UN World Tourism Organization 2010). Occupations in tourism often draw heavily on the traditional domestic skill set of women, which has translated to relatively “unskilled” work (Sinclair 1997). This type of job is often shed first when industries expect long-term declines in demand. Research exploring the effects of terrorist attacks on the tourism industry is equally well established and reports a significant negative effect of terrorism on tourism (Enders and Sandler 1991; Enders, Sandler, and Parise 1992; Fleischer and Buccola 2002; Sandler and Enders 2008; Thompson 2011). Partitioning the data by high and low tourism countries provided necessary clarity to support the hypothesis that the effect is observed primarily when terrorism influences labor demand in industries where females occupy a disproportionate amount of the workforce.

When analyzing the effect of terrorism severity on female labor force participation, we found that effects are comparable for both countries with high and low deaths per attack, which suggests that incidence of terrorism plays a stronger role in the relationship. Stronger effects of attacks against government targets imply that these attack types may be more effective at demonstrating government instability and terrorist capability for consistent attacks. The larger effect size observed countries with more frequent attacks against the government may indicate an unstable government facing a more capable terrorist opposition. This supports the possibility of a longer term effect reducing foreign investment, tourism, and ultimately female labor force participation. Interestingly, more recent research has shown that attacks against government targets have declined over time in favor of attacks against softer civilian targets (Brandt and Sandler 2010, 2012). This could indicate a reduced effect of terrorism on female labor force participation in the future, as terrorists focus on less fortified targets and governments consolidate their power honing their efforts against terrorist groups.

While the evidence is strong for an effect primarily associated with a relationship between terrorism and labor demand in industries that employ larger percentages of women, we cannot entirely rule out other mechanisms at work due to statistically significant effects observed in low tourism countries. For example, the relationship could be a result of the effect that terrorism has on perceptions of risk. In an environment of heightened threat, families might be concerned about leaving their homes, children, or belongings unprotected. Mothers may take on the added responsibilities for this and opt to stay at home to watch over home and family. Along similar lines, school closings due to terrorism could force mothers home if other sources of child care are not available. In recent years, rocket attacks in southern Israel caused schools in several cities to close, resulting in 150,000 students staying home (Pfeffer et al. 2011). While single school closings are not likely to influence employment, frequent attacks with consistent closures might lead to an increased need for child care services and possibly a reduction in female labor force participation. Given the disparate effect sizes observed in high and low tourism countries, there is stronger evidence in our analysis for an effect based in labor demand; however, more research is needed to understand the underlying mechanisms through which

terrorism influences labor gender disparities and whether this effect has implications beyond the labor market (e.g., on marital and fertility decisions or overall societal well-being).

How societies act in response to the perception of threats from terrorist groups has important implications for policy makers. Contrary to the existing empirical work, using a more sophisticated model, we were able to isolate the directional effect and found causal evidence that terrorism exerts a negative effect on female labor force participation and increases the labor gender gap. Our findings explain some of the disparities between previous research and results and put to rest some theories suggesting reverse directionality. Furthermore, our results show that policy makers must be acutely aware of the possible implications of terrorism on industries with a disproportionate number of females or males as terror attacks can impact gender parity in the larger labor market. Reducing the number and consistency of terrorist attacks may help to solidify confidence in some of these industries and ultimately reduce the effect they have on the demand for female labor. This possibility holds true for any industry where a single demographic occupies a disproportionate number of less-skilled jobs that are shed more quickly when terrorism affects demand.

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Notes

1. Krieger and Meierrieks (2011) provides a comprehensive overview of the studies that have illuminated various factors related to terrorism.
2. For examples of studies linking economic conditions and terrorism, see Krueger and Maleckova (2003), Berrebi (2003, 2007), Abadie (2006), Piazza (2006), Krueger and Laitin (2008), and Benmelech, Berrebi, and Klor (2012).
3. We inverted the original scales for this indicator so that 7 indicated the highest levels for civil liberties or political rights. We then summed the civil liberties and political rights indicators from this survey into one indicator labeled civil liberties.
4. Attacks with targets designated as “other” or “unknown” were not included in the analysis presented here due to the relative scarcity of these cases.
5. Three lags (0, 1, and 2) were chosen as the effect disappeared in additional lagged periods. Three lags also minimized the Akaike Information Criterion (AIC) and the Schwarz’s Bayesian Information Criterion (SIC/BIC/SBIC) while maintaining all statistically significant lags of terrorist attacks.

6. Storms include tornados, hurricanes, typhoons, and more generally tropical cyclones.
7. Differing from our other specification, we took the natural log of our terrorism measure to allow for an intuitive coefficient interpretation in our first stage IV modeling. The use of natural logs for the instruments also provided a better fit and explained more of the variance in the first stage regressions.
8. For the IV approach using lagged neighboring country terrorism, we use the second and third lag to ensure exogeneity in the IV, as there is some concern that the contemporaneous period could be endogenous.
9. One standard deviation for within group terrorism is approximately thirty-three terrorist incidents.
10. As a further test on robustness, we employed a falsification approach to the fixed effects and first differenced models. To implement this, we introduced future terrorist attacks into the specifications to assess whether something that should clearly be unrelated to current year fluctuations in labor force participation rates, in fact, does not have an impact. As theoretically expected, future terrorist attacks were not statistically associated with current year changes in female labor force participation or the labor gender gap. This bolsters confidence in the timing, direction, and the identification of a causal direction of our effect. The tables for this analysis are available upon request.
11. While both instrumental variables passed tests of underidentification, the natural disasters IV did not pass the rule of thumb for weak instruments (F -stat > 10) even though first stage regressions indicated its statistically significant relationship with terrorist incidence. This was part of the reason for using two IV approaches, as it created a concern that the results might be biased toward OLS. The second IV approach using lagged nearby domestic terrorism easily passed all tests of strength (F -stat of approximately 18), and the similar coefficient magnitudes of the two approaches further assuaged concerns of weak instrument bias for the first IV approach.
12. Effect on female labor force participation equals $\beta \ln(1.1) = -1.983 \ln(1.1) = -0.189$.
13. Due to the few years for which available information about tourism activity overlapped with our terrorism analysis, we chose to partition the data into two groups of countries instead of including it as a covariate or interaction term. International tourism is measured as expenditures by international inbound visitors, including payments to national carriers for international transport and is available from 2005 to 2007. Receipts included any other prepayment made for goods or services received in the destination country and are measured as a percentage of total exports (World Bank 2010). Data were first averaged by country over the three years and then split into high and low groups at the median of the natural log of the average of all countries.
14. The online appendix is located at the following URL: https://dl.dropboxusercontent.com/u/6586176/Terr_FLFPR_App/APPENDIX%20to%20Terrorism%20and%20the%20Labor%20Force.pdf.

Supplemental Material

The online appendix is available at <http://jcr.sagepub.com/supplemental>.

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