

THE EFFECT OF TERRORISM ON PERSONAL DISPOSABLE INCOME: EVIDENCE FROM PAKISTAN

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The destruction caused by terrorism impacts many aspects of the economy including the livelihoods of citizens where the attacks take place. Using pooled cross-sectional data from Pakistan's Labor Force Survey from 2001-02 to 2014-15 and terrorist incidents from the Global Terrorism Database, we quantify the impact of terrorism on personal disposable income with an instrumental variable is constructed using the distance to the Afghan border for each district interacted with the number of civilians killed in US military drone strikes Pakistan. The findings show that a unit increase in terrorist incidents causes a 4.14 percent decrease in personal disposable income.

JEL classifications: D31, D74, H56.

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1. Introduction

After the September 11 USA terrorist attacks, Pakistan emerged as the frontline ally in the war against terrorism due to its strategic and geographic position. As a result, the underlying social, economic, and demographic features of Pakistan fundamentally changed. Persistent

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exposure to terrorism interrupted and changed daily life and economic activities. Work and business for Pakistan citizens were adversely affected. There was increased uncertainty in the country. This paper investigates the impact of terrorist incidents on personal disposable income, which has been under-researched to date. Pakistan has been plagued with terrorist incidents during the past decades making it important to estimate the relationship between terrorism and income. Terrorism is an important concern in everyday life, not only in Pakistan but also in other similar countries.

This paper contributes to the academic literature in the following ways: first, the consequences of terrorism on personal disposable income are examined by using an instrumental variable approach. This approach addresses the issue of reverse causality and omitted variable bias. In contrast to other studies, our study uses personal disposable income rather than per capita income. This may be one of the reasons our results differ from Alan B. Krueger and Jitka Malečková (2003). We show the negative impacts of terrorism on personal income.

To the best of our knowledge, our study is the first that examines personal disposable income to demonstrate the terrorism-income relationship. Other studies use more macro approaches using per capita income (Alberto Abadie, 2006, Walter Enders et al., 2016, Khusrav Gaibulloev and Todd Sandler, 2011, Martin Gassebner and Simon Luechinger, 2011). Using household survey data is more granular and can provide policy insights that are not discernible with broader measures of per capita income. Understanding the impacts of terrorism at a household level will have implications, not only for the Ministry of Finance, Revenue, and Economic Affairs, for example, but also the Ministry of Federal Education and Professional Training, the Ministry of Commerce and Textile, and the Ministry of Industries and Production. We can do this because we can segment the results by level of education, organization type, business type, and occupation type. The remainder of the paper is structured as follows: Section 2 reviews the existing literature on the relationship between income and terrorism, Section 3 introduces the background of terrorist incidents in Pakistan, Sections 4 and 5 describes the data and methodological approach, respectively. Section 6 presents the empirical findings and Section 7 concludes the paper.

Previous Research on Terrorism's Impact on Income

The link between terrorism and income has been the subject of a significant amount of research, both theoretical and empirical. This research has covered both multi-country and individual country contexts, using a variety of econometric techniques.

Sanjeev Gupta et al. (2004), among others (Walter Enders and Todd Sandler, 1996, Khusrav Gaibulloev and Todd Sandler, 2008), have outlined the different channels whereby terrorism or armed conflict has impacted the economy. Terrorism disrupts business activity. This has flow-on effects of reducing the tax base and hence tax revenues. Terrorism activity can destroy physical infrastructure, adding to the cost of doing business as bridges, ports, roads and airports may be affected. Terrorism may deter foreign investment into a country. Terrorism may affect the supply chain by decreasing supply. This may result in inflation, as goods and services become scarcer. In response to terrorist activity, governments may

respond by increasing their military expenditures. Higher government expenditure on the military may mean decreasing outlays on health, education and other more productive sectors. Decreases in spending on health and education can have long term effects on the economy as a result of a less educated and less healthy population. Increased government spending may also crowd out private sector investment, which will also be affected by lower business confidence. Terror attacks decreased employment and total earnings (Abel Brodeur, 2018). Abel Brodeur (2018) notes that successful terrorism attacks receive more media coverage and contribute to an increased level of consumer pessimism and business confidence.

It has also been pointed out that reverse causality might occur. Contiguous poor economic performance might fuel discontent among various elements of the population resulting in violence and civil unrest (Sanjeev Gupta, Benedict Clements, Rina Bhattacharya and Shamit Chakravarti, 2004)2004. Widespread unemployment may result in stress and disillusionment with the current political regime leading to political violence (Zahra Malik and Khalid Zaman, 2013). But more employment opportunities can reduce the incentive to participate in terrorist activities (Shabir Hyder et al., 2015). Growing income inequality may lead to disenchantment and drive individuals to terrorist activities. Although terrorism activity might have a nonlinear relationship with income as those with little to no income may not be able to support terrorist activity (Walter Enders, Gary A. Hoover and Todd Sandler, 2016). While using instrumental variables to account for this has been problematic in cross-country studies (Alberto Abadie and Javier Gardeazabal, 2003), instrument variables have been used successfully in several single-country studies (see Sanjeev Gupta et al., 2001 for example).

Empirically, numerous multi-country studies have demonstrated and quantified the impact of terrorism. Examining the fiscal consequences of armed conflict and terrorism in 22 low-income and middle-income countries, Sanjeev Gupta, Benedict Clements, Rina Bhattacharya and Shamit Chakravarti (2004) find that armed conflict is associated with lower economic growth and higher inflation, reduced tax revenues, and lower investment. The higher government spending on defense impacts inflation rather than lowering spending on healthcare and education. (Khusrav Gaibulloev and Todd Sandler, 2011, 2008, 2009) undertake multi-country studies on Asia, Western Europe, and Africa. In Asia, transnational terrorist attacks impact GDP to the effect that an additional terrorist incident per million persons reduces GDP per capita growth by about 1.5% (Khusrav Gaibulloev and Todd Sandler, 2009). Internal conflicts were estimated to have a larger negative impact than transnational terrorism. Less developed Asian countries were impacted by political violence to a greater degree than more developed countries in Asia. More developed countries were better resourced to deal with the impacts of terrorism and conflicts.

In Western Europe, transnational terrorism has a greater negative impact on income per capita than domestic terrorism across 18 countries in that region (Khusrav Gaibulloev and Todd Sandler, 2008). More specifically, an additional transnational terrorist incident per million persons reduces economic growth by about 0.4 percentage points. Different from their Asian study, Western Europe is more impacted by transnational terrorism

than domestic terrorism. In line with theory, terrorism reduces investment but increases government expenditure. Domestic terrorism is a more significant determinant of crowding-out of investment and crowding-in of government spending (Khusrav Gaibulloev and Todd Sandler, 2008). These multi-country studies often demonstrate that terrorism has negative spillover effects on neighboring countries (James C Murdoch and Todd Sandler, 2002). For 51 African countries across 1970 to 2007, Khusrav Gaibulloev and Todd Sandler (2011) find that, on average, the negative marginal impact of transnational terrorism in Africa is a modest 0.1 percentage point of income per capita growth. Somewhat surprisingly, given its prevalence, domestic terrorism is estimated to not have a significant effect on African income per capita growth.

Studies of the impact of terrorism on specific economies can be found in the literature. For example, examining the situation in the Basque Country, Spain, after the outbreak of terrorism in the 1960s, Alberto Abadie and Javier Gardeazabal (2003) notes that GDP per capita decreased about 10 percentage points relative to a control region. Given Pakistan's history with terrorism, several studies are exploring this relationship. Using a cointegration model from 1975 to 2011, Zahra Malik and Khalid Zaman (2013) find that several macroeconomic variables 'granger cause' terrorism. Those variables are population growth, price level, poverty, and political instability while income inequality, unemployment, and trade openness have no long-run relationship with the terrorism incidence in Pakistan. Unemployment has a bi-directional causality with the terrorism incidence in Pakistan.

Extending a Solow Growth model, Shabir Hyder, Naeem Akram and Ihtsham Ul Haq Padda (2015) estimate that a one percent increase in terrorist incidents results in a decrease in per capita GDP growth by 0.39 percent. Apart from the loss of lives, terrorism also contributed to increased poverty, capital flight, destruction of infrastructure, reduction in FDI and exports, lower government revenues, and resource allocation from development expenditure to defense expenditure. Muhammad Zakaria et al. (2019) use a structural model to assess both the direct and indirect economic impacts of terrorism in Pakistan from 1972 -2014. Muhammad Zakaria, Wen Jun and Haseeb Ahmed (2019) quantify the negative impact that external and internal conflicts have on economic growth. A one percent increase in external conflict decreases economic growth by 0.048 percent while internal conflict has a more moderate negative impact on economic growth (0.015). Terrorism also negatively impacts both foreign and domestic investment. A one percent increase in terrorism decreases FDI by 0.104 percent while the same increase in terrorism results in a 0.039 percent in domestic investment and 0.002 percent fall in economic growth.

Sultan Mehmood (2014) uses a range of econometric models including Quasi-Structural VAR, Vector Error Correction Model, Impulse Response Functions, and Granger-Causality tests to study the relationship between terrorism and the macro-economy. He finds that terrorism has cumulatively cost Pakistan around 33.02% of its real national income, in other words, around 1% of real GDP per capita growth every year over the period 1973 to 2010.

As alluded to in the Introduction, the large majority of previous work has used macroeconomic measures of income. Using this measurement can sometimes mask some of the more nuanced impacts of terrorism on income. Most studies use country-level data

and employ gross domestic product per capita as a proxy variable for income. This may contribute to the diverse findings. As such further research is needed. This research differs from previous work through the use of household-level income data. This granular level data may be more insightful in representing the situation of households in determining the consequences of terrorist incidents.

Terrorism background in Pakistan

Pakistan has four provinces (KPK, Sindh, Punjab, and Balochistan) and two self-governing regions (Azad Kashmir and Gilgit Baltistan). Pakistan is the main ally with the USA in the war against terror due to the rise of extremism and security concerns in Pakistan (Umbreen Javaid, 2011). The two provinces KPK and Balochistan share the western border of the country with Afghanistan. Table 1 shows that KPK and Balochistan hosted approximately 65 percent of all terrorist incidents in Pakistan across the 2000 to 2015 period. The regions closer to the Pakistan-Afghanistan border witness more terrorist incidents compared to those located further from the border (Faiz Ur Rehman and Paolo Vanin, 2017).

While Pakistan did not have any economic sanctions imposed on it due to its alliance with the USA, it did experience heavy social and economic losses (Fazal Rabbi, 2012). Pakistan has lost around \$US35 to 40 billion since 2000-01 due to the conflicts in the region (Arshad Ali, 2010). Peace in Afghanistan has resulted in stability in Pakistan (Umbreen Javaid and Rameesha Javaid, 2016). After a coalition with the USA in 2001, many militants relocated to the tribal areas of Pakistan situated on the Pakistan-Afghanistan border (Rohan Gunaratna and Anders Nielsen, 2008).

The war against terror in Afghanistan increased terrorist incidents in Pakistan. During the late twentieth century, the Taliban emerged as a main political force in Afghanistan after the Soviet collapse which had strong support in Pakistan (Nasreen Akhtar, 2008). The Taliban established its networks along the Pakistan-Afghanistan border. At the beginning of the twenty-first century, the Al-Qaida¹ leadership found safe refuge in Pakistan (Daniel Markey, 2007). Persistent terrorism in Pakistan is the result of the Afghanistan war.

Although Punjab had 307 terrorist incidents from 2000 to 2015 and Sindh had 1,265 incidents, the damage caused by terrorist incidents in Punjab was greater, on average five deaths per incident, compared to two deaths per incident in Sindh. Figure 1 shows the targets for terrorist incidents. The top three targets are individuals businesses and property; security forces (both military and police); and government organizations (general and diplomatic). A total of 1,713 incidents took place against private individual businesses and property.

Terrorists often target the general public directly (R Watson and T Lansford, 2016). Security forces remain the second most targeted group with 1,288 incidents. There were 291 terrorist incidents against religious figures as sectarian conflicts escalated with the USA war against Afghanistan (Lubna Sunawar, 2015). Pakistan has suffered human loss, infrastructure destruction, and decreased business activities due to this terrorism (Arshad

¹. Al-Qaeda is a faction, which was headed by Usama bin Laden and responsible for the September 11 incidents.

Ali, 2010). The majority of these incidents take place within metropolitan municipalities of the country. Terrorists consider these locations more impactful. The media can cover these incidents, giving terrorists heightened publicity to convey their message to larger audiences (Yonah Alexander and Seymour Maxwell Finger, 1979). Moreover, terrorist incidents in these locations produce more destructive results both in terms of social and infrastructure aspects.

Table 1. Terrorist Incidents in Pakistan by Region (2000-2015)

Province	Incidents	Killed	Injured	Incidents Percentage	Killed percentage	Injured percentage
KPK	1,616	5,041	8,976	34.78	41.09	36.38
Balochistan	1,401	2,901	5,989	30.15	23.65	24.27
Punjab	307	1,549	4,149	6.61	12.63	16.82
Sindh	1,265	2,298	4,180	27.23	18.73	16.94
Islamabad	57	479	1,379	1.23	3.90	5.59
Total	4,646	12,268	24,673	100	100.00	100.00

Source: Adapted from the Global Terrorism Database (GTD)

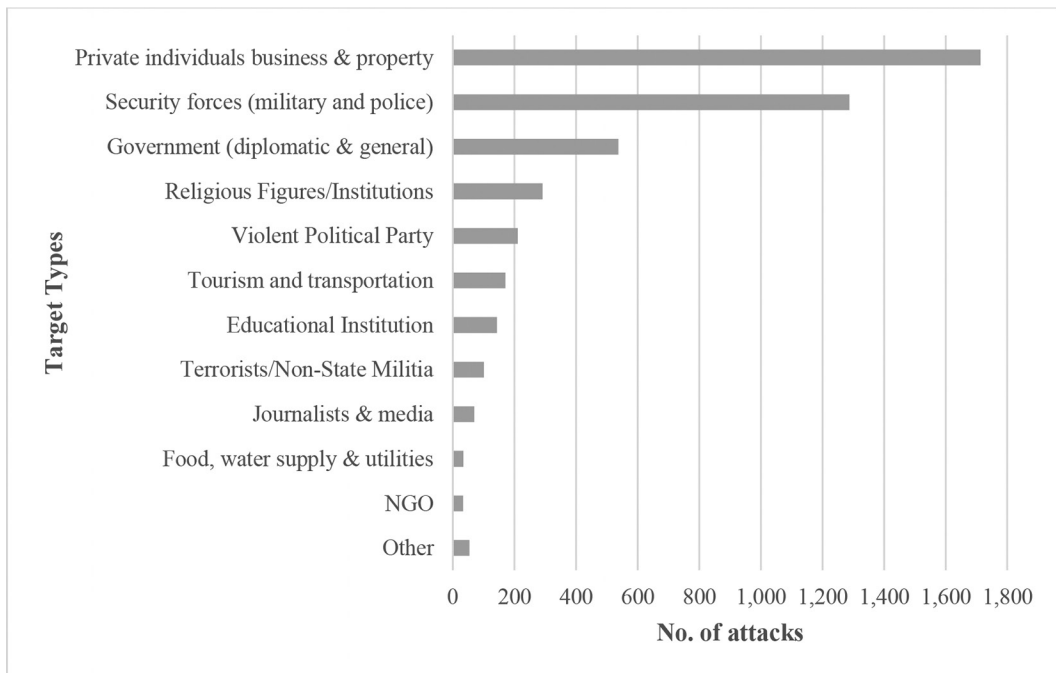


Figure 1. Terrorist Targets in Pakistan (2000-2015)

Source: Adapted from the Global Terrorism Database (GTD)

Data

We employ four data sources in this study. First, our study contains cross-sectional data from the Labor Force Survey (LFS). These surveys range from 2001-02 to 2014-15. The Pakistan

Bureau of Statistics (PBS)² collects this data every year. The database contains information about labor and employment. We extract the main outcome variable, personal disposable income during the past month, individual demographics, and economic controls from this source. We prefer to use the LFS over the PSLM (Pakistan Social and Living Standards Measurements) due to the richness of the data with respect to national labor force variables. While the PSLM contains variables such as socio-demographic characteristics of the total population (age, sex, marital status, level of education, current enrolment and, migration), the LFS contains more detailed data on national labor force data (number of persons employed, unemployed, and underemployed or out of the labor market; explanation about major occupational trades and the nature of work undertaken by the organizations; statistics on the employment status of the individuals, for example). Second, our key variable for terrorist incidents that are obtained from the Global Terrorism Database (GTD). This data source is organized by National Consortium for the Study of Terrorism and Responses to Terrorism (START) (2015). This data source contains characteristics of terrorist incidents. Third, we obtain the number of civilians who died in US drone strikes, within the territory of Pakistan along the Pakistan-Afghanistan border from 2004 to 2015 from The Bureau of Investigative Journalism³. The data for drone strikes are not available before 2004. Noting data from the TBIJ has been subject to criticism due to its reliability, we also use data on the number of civilians killed due to drone strikes from the New America Foundation. The relevant coefficient is significant with a magnitude is 0.1417 with F stats of IV is more than 30. This demonstrated our analysis is robust using an alternative data source. Fourth, we estimate the distance from each district to the Afghanistan border in kilometers (Faiz Ur Rehman and Paolo Vanin, 2017) by using Google Maps and the National Hurricane Center (USA)⁴. We employ Google Maps to measure the road distance of each district to the Pakistan-Afghanistan border. We use the National Hurricane Center calculator to convert the distance into kilometers by using longitude and latitude information.

The Pakistan Bureau of Statistics conducts the Labor Force Survey almost every year. During our selection period 2001-02 to 2014-15, the data for the years 2002, 2004, and 2011 were unavailable. The data comprises information from all four provinces and the capital (Islamabad). Around 2% of the Census falls in the disputed region where there is no access to households. The method of stratified sampling applies to the remaining 98% of the population. This process divides each city or town into different blocks. Each block denotes a Primary Sampling Unit (PSU). Every PSU consists of 200-250 households. By using systematic random sampling, 12 households are chosen from each urban and rural block respectively⁵ (Government of Pakistan, 2014).

First, we restrict the sample to those aged between 16 and 60 years. This age is the legal age of working in Pakistan. The upper bound represents the age of retirement (Muhammad Shehzad Hanif et al., 2018). There are 21,853 total observations for analyzing the terrorism

² <http://www.pbs.gov.pk>

³ <https://www.thebureauinvestigates.com/stories/2017-01-01/drone-wars-the-full-data>

⁴ <http://www.nhc.noaa.gov/gccalc.shtml>

⁵ <http://www.pbs.gov.pk/content/methodology-0>

and income relationship from 54 districts over the period 2001-02 to 2014-15. In Table 2 Panel A to C, we show the outcome variable and the control variables of individual demographics and economic variables; independent variables; and an instrumental variable. Personal disposable income is what an individual earned during the past month. This is our main outcome variable of interest. Personal disposable income during the last month averaged 10,181 PKR⁶, ranging from 50 to 98,001 PKR.

With respect to identifying each district, we limited by the data from available from the Pakistan Bureau of Statistics. There is a total number of 114 districts in four provinces of Pakistan. The district of Balochistan has 26 districts. However, the LFS data from Balochistan province aggregated these 26 districts into six divisions (a larger unit than district). This aggregation was done from 2001 to 2012. Only two data waves (2013 and 2014) have been collected by district. The other three provinces contain 85 districts. Due to the data limitations in Balochistan, particularly related to employment details, we needed to aggregate districts in divisions for the whole dataset for Balochistan.

Almost 8% of the sample has almost no income. One possible interpretation of this is that either they are available for work but have no employment opportunity or they do not want to report their income. To deal with this situation, we take the logarithm of personal disposable income. Those with no income are then recorded as missing values. The remaining sample is personal disposable income belonging to the individual living in a household, working in various industries. The data under analysis also include the personal disposable income of individuals working in different types of organizational structures. Personal disposable income follows a positively skewed distribution. We acknowledge that this missing data may have an impact on the analysis, potentially biasing the coefficient downwards. At only eight percent, we believe qualitatively our results would hold but coefficients may be marginally higher with an incomplete dataset. We note this is a limitation of this research.

We control for the household size. The household size ranges from 1 to 51. The average household contains seven members. In this Labor Force Survey from 2001 to 2014, 52 percent of the sample are males and 48 percent are females. But when it comes to reporting their income, around 90 percent are males. The main reason is that, when reporting income, most wives undertake domestic unpaid work. The female labor participation rate is usually lower in developing countries (Mr Sonali Das et al., 2015), as it is in Pakistan. Additionally, individuals residing in urban areas account for 40 percent of the sample and the remaining 60 percent reside in rural areas. Monthly income is generally more stable and common in urban regions rather than in rural areas. Around 67 percent of the individuals in this study are married and the remaining proportion is single. Marital status plays an important role in the utilization of personal disposable income. We control for marital status.

In the overall sample around 37 percent of individuals belong to the agricultural sector while the rest work in a non-agricultural industrial sector. This is a standard classification in the existing literature. Pakistan is an agricultural country. For those that report income,

6. Pakistan rupees (currency unit widely used in Pakistan)

around three percent of the individuals work in the agricultural sector, and 97 percent work in a non-agricultural industry. The income of the people in the agriculture sector is subject to more fluctuations.

The Labor Force Survey sample data shows income by Province. Punjab has a 43 percent share, Sindh 25 percent, KPK 18 percent, and Balochistan 14 percent share. When it comes to reporting personal disposable income, the participation share of each province is as follows; Punjab 31 percent, Sindh 33 percent, KPK 26 percent, and Balochistan 10 percent. In Pakistan, the education system ranges from primary education (five years of schooling) to elementary education (eight years of schooling), secondary education (ten years of schooling), intermediate (twelve years of education), undergraduate and professional certifications (16 years of education), and MPhil & Ph.D. We categorize this system into four education levels: illiterate (people with no formal education) (23%), lower level education (contains up to primary education) (15%), medium level education (accounts for elementary and secondary education) (32%), and higher education level (30% of the overall sample). More individuals with education reside in the Punjab province. There are two reasons for this. First, Punjab is the most populous province in Pakistan. The Punjab province has better education facilities.

We also control for the occupations of the workers using eight categories. These occupation types are managers (6%); professionals (7%); technicians (15%); clerical workers (6%); service & sales (15%); elementary occupations (26%) includes cleaners and helpers, agricultural, forestry, and fishery workforce, laborers in mining, construction, manufacturing, and transport, food preparation assistant, street and related sales and service workers, garbage related workers and other elementary occupation workers; crafts and related occupations (17%); and plant & machine operators (9%) includes stationary plant and machine operators, assemblers, and drivers and mobile plant operators.

Table 2. Summary Statistics

Variables	Obs.	Mean	SD	Min	Max
<i>Panel A: Outcome variable and controls</i>					
Net personal income earned last month* (In Pakistan rupees, index to 2015 prices)	21,853	10,181.02	10,993.33	50	98,001
Age	21,853	33.59	11.22	16	60
Household size	21,853	7.24	3.28	1	51
Male	21,853	0.90	0.29	0	1
Urban	21,853	0.64	0.48	0	1
Married	21,853	0.67	0.47	0	1
Agriculture	21,853	0.03	0.16	0	1
Provinces					
Punjab	21,853	0.31	0.46	0	1
Sindh	21,853	0.33	0.47	0	1
KPK	21,853	0.26	0.44	0	1
Balochistan	21,853	0.10	0.30	0	1

Variables	Obs.	Mean	SD	Min	Max
Educational attainment					
No formal education	21,853	0.23	0.42	0	1
Lower education	21,853	0.15	0.35	0	1
Medium education	21,853	0.32	0.47	0	1
Higher education	21,853	0.30	0.46	0	1
Occupation					
Managers	21,853	0.06	0.23	0	1
Professionals	21,853	0.07	0.26	0	1
Technicians & assistants	21,853	0.15	0.36	0	1
Clerical & support workers	21,853	0.06	0.23	0	1
Service & sales	21,853	0.15	0.36	0	1
Elementary occupation	21,853	0.26	0.44	0	1
Crafts and related	21,853	0.17	0.37	0	1
Plant & Machine operator	21,853	0.09	0.29	0	1
Panel B: Terrorism Variables					
Total terrorist incidents (past 1 year)	21,853	5.42	17.27	1	263
Transnational terrorist incidents (past 1 year)	21,853	0.20	0.91	0	23
Domestic terrorist incidents (past 1 year)	21,853	5.23	16.65	0	256
Suicide terrorist incidents (past 1 year)	21,853	0.28	0.98	0	12
Non-suicide terrorist incidents (past 1 year)	21,853	5.15	16.72	0	258
Panel C: Instrumental variable					
Distance to Afghanistan border (Km)**	91	345.97	188.48	43	765
Civilians killed by US drones***	10	42.10	40.55	0	100

*1 US Dollar=104.97 PKR (Pakistani rupee) in 31/12/2015

**Data of distance to the Afghanistan border is at the district level.

***the number of civilians killed by drone strikes plotted by the US military is at the year level.

The GTD data contains information about terrorist incidents such as the date, type, target, weapons type, and location of incidents. We classify terrorist incidents into two categories. First, the difference between suicide and non-suicide terrorist incidents has gained significant importance in the academic literature (Seung-Whan Choi, 2014). Suicide terrorist incidents spread more tribulations among the general public (Robert A. Pape, 2003). Suicide terrorist incidents are less frequent than non-suicide incidents. Suicide incidents are more destructive. Second, transnational and domestic terrorist incidents have differing impacts (James A. Piazza, 2008). According to Walter Enders et al. (2011), a transnational terrorist incident takes place if the victim and perpetrator both possess different nationalities. We follow Walter Enders, Todd Sandler and Khusrav Gaibulloev (2011) to isolate transnational terrorist incidents from total terrorist incidents. Some of the terrorist incidents have inadequate details about their location. The longitude and latitude of each terrorist incident are given in this data source. We employ this location information to determine the district of the terrorist incident. We include only those terrorist incidents that contain at least one person killed or injured (Walter Enders, Todd Sandler and Khusrav

Gaibulloev, 2011). We assume that these terrorist incidents are reported more accurately. Some terrorist incidents don't injure or kill. These terrorist incidents may have little or no influence on personal disposable income.

In Table 2 Panel B, our main explanatory variable is the total terrorist incidents that occur in a particular district during the past year. However, we also consider more specific terrorist incidents as our explanatory variables e.g. transnational, domestic, suicide, and non-suicide. On average, a district had 5.42 incidents during the past year. One district out of 54 districts had 263 terrorist incidents during the past year. One district had a maximum of 12 suicide incidents and another district had 258 nonsuicide incidents over the past year. Likewise, one district had a maximum of 23 transnational incidents and another had a maximum of 256 domestic incidents. Domestic terrorist incidents and non-suicide terrorist incidents are more prevalent than transnational and suicide terrorist incidents.

In Panel C, we present the instrument variable by estimating the shortest distance from each district to two exit points on the Pakistan-Afghanistan border by using Google Maps and then converting this distance into kilometers by employing the National Hurricane Center estimator. This distance is constant over time and is captured by district and year-fixed effects. This distance interacts with the number of civilians killed yearly due to drone strikes by the US military along the Pakistan-Afghanistan border, which varies every year. As noted above, the aggregation of the 26 districts into six divisions in the province of Balochistan meant we took the average distance to the Afghan border from the central point of the division. In this way, we have adjusted the distance variable to the Afghan border in our analysis.

The instrumental variable shows the product of two terms: the inverse of the distance in kilometers from each district to the Pakistan-Afghanistan border and the log of the number of civilians killed due to drone strikes. Both of these terms move in the same direction and are positively related to potential terrorist incidents (Rafat Mahmood and Michael Jetter, 2019). The data shows that the districts located closer to the Pakistan-Afghanistan border absorb a greater number of terrorist incidents. The inverse of the distance implies that the shorter the distance, the greater the number of incidents. This instrumental variable is positively correlated with terrorist incidents. Eschenburg, Faber, and Knaack (2011) shows the link between drone strikes and terrorist attacks. However, we argue that the US military drone strikes are not directly related to the outcome variable of personal disposable income. The US military used drones to attack militants who have found safe havens in remote tribal areas in the outskirts of Pakistan connected with Afghanistan. In our model, drone attacks do not affect the outcome variable directly but through only one channel of our independent variable. We address the possibility of endogeneity in the next section.

Methodology

To understand the income and terrorism relationship, we estimate the linear model below:

$$Y_{idt} = \alpha + \beta \text{LnIncidents}_{d,t-1} + \theta X_{idt} + \phi U_{idt} + \mu_t + \gamma_d + \varepsilon_{idt} \quad (1)$$

In the above equation, Y_{idt} is the log of the sum of net income earned from all sources, during the past year by an individual i who resides in a particular district d in a specific year t . Our key explanatory variable is $LnIncidents_{d,t-1}$, which is the log of the sum of terrorist incidents during the past year.

Furthermore, X_{idt} is a set of demographic controls that includes gender, location (urban or rural), marital status, education level, household size, and age of individuals. Moreover, U_{itd} represents economic controls consisting of industry employment, and occupation. We separate the individual's industry into the agriculture and non-agriculture sector. There are nine categories of occupations. Also, μ_t represents the sample survey year ranging from 2001 to 2014. This removes any specific trends from 2001 to 2014 and it also captures the nominal effect over time. Furthermore, γ_d shows district-level fixed effects. These district-level fixed effects γ_d control for time-invariant geographical and physical factors. Lastly, ϵ_{idt} characterizes the error term in the model.

The β is our main coefficient of interest, which represents the elasticity between income and terrorism. A one percent change in terrorism leads to the β percentage change in income. Using equation (1) we can find a correlation between income and terrorism but numerous factors can bias β . Certain issues can arise while dealing with cross-sectional data. First, there may be omitted variable bias. The success of law enforcement agencies in stopping terrorist attacks is difficult to capture. If these institutions successfully capture militants there may be two consequences: other militants can plot terrorist incidents in response to this capture or there will be a possibility of no incident at all. In both cases, equation (1) cannot capture this impact. Furthermore, people in different regions of the country have different characteristics. We are unable to estimate these attributes due to the unavailability of data or the lack of proxy variables. We employ district fixed effects to deal with such differences. Second, there may be reverse causality. We estimate the impact of terrorism on personal disposable income during the past year. Our sample comprises the labor force that involves economic activities during persistent terrorism exposure. But lower income is found to be a significant determinant of terrorism (Walter Enders and Gary A. Hoover, 2012, James A. Piazza, 2011, 2006). Conversely higher income-driven standards of living have also been found to be a main predictor of terrorism (Claude Berrebi, 2007, Alan B. Krueger and Jitka Malečková, 2003). Differing levels of income can boost terrorist activities.

Identification strategy

To deal with the above-mentioned issues, we employ an instrumental variable approach to test the causal relationship between terrorism and income. The exclusion restriction holds when the causal path from the instrumental variable to the outcome variable only occurs through the predictor variable of interest (Joshua D Angrist and Alan B Krueger, 2001). We employ an interaction term as an Instrumental Variable (IV) for terrorist incidents in the past year in a particular district. The interaction term is the product of two different terms. The distance of each district to the Afghanistan border (in kilometers) and the number of civilians killed due to drone strikes (Unmanned Aerial Vehicles) by the US military. The distance of each district to the border is constant but the number of civilians

killed every year varies. The intuition is that an increasing number of civilian casualties from drone incidents motivates people to plot more terrorist incidents or join terrorist organizations for revenge. This component of the instrument variable is independent of personal disposable income. Moreover, household-level data, for example, demographics, occupation, employment, and income, of the districts are afflicted by drone strikes is unavailable. So these drone strikes can only influence our outcome variable i.e. personal disposable income, through terrorist incidents.

As part of the identification strategy, we have applied district-fixed effects, so we include variables that are constant across districts or change at a constant rate over time. While there is a limitation of data availability with economic indicators at a district level over time, we assume that using district fixed effects can address this deficiency. Moreover, we incorporate a time trend in our model that captures the path of the variable over time, providing forecasts of the economic variable. The time trend captures the effect of relevant variables that change over time but are not directly measurable. Based on both district-fixed effects and inclusion of a time trend variable in our model, we capture the effects of lower-income districts nearby the Pakistan-Afghanistan border, regardless of the influence of the violent activities.

Second, Pakistan has two exit points with the border to Afghanistan from two provinces namely Khyber Pakhtunkhwa (Torkham exit point) and Balochistan (Chaman exit point). From 2000 to 2015, the Pakistan districts that are closer to Afghanistan absorb much more terrorist incidents compared to districts farther away from the Afghan border. The provinces that share a border with Afghanistan have 65 percent of total incidents while the other two provinces have a 35 percent share of terrorist incidents. KPK and Balochistan have a long border with Afghanistan (Faiz Ur Rehman and Paolo Vanin, 2017). The Afghan war is the main determinant of terrorism in Pakistan (Arshad Ali, 2010).

Table 3. IV first stage (Dependent variable: log past terrorist incidents)

Variables	1	2	3
log (Inverse of distance to Afghan border*No. of civilian killed due to drone incidents by US military)	1.523*** (0.281)	1.518*** (0.281)	1.468*** (0.286)
Observations	22,239	22,239	21,233
Wald F statistic	29.47	29.26	26.33
District Fixed Effects	Y	Y	Y
Year Dummies	Y	Y	Y
Demographic Controls	N	Y	Y
Economic Controls	N	N	Y

Robust standard errors in parentheses, which are clustered at the district level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3 presents the first stage of the instrumental variable analysis. The dependent variable is the log of terrorist incidents during the past year at the district level. The coefficients represent the elasticity between the two variables. Columns 1 to 3 present the results of different regression specifications by varying the control variables. Column 3 contains the

full control specification including years and district fixed effects, individual demographics, and economic controls. All the coefficients show a very strong correlation between an instrumental variable and terrorist incidents during the past year (Columns 1 to 3).

Results and discussion

In Table 4, we present our benchmark estimates that contain six columns. Columns 1 to 3 display the OLS results and Columns 4 to 6 show the instrument variable estimations. Starting from Column 1, we apply year and district fixed effects. The corresponding coefficient is negative and statistically significant. In Columns 2 and 3, we additionally control for demographics, industry, and occupation as well. Again the coefficients are consistent with Column 1. This infers a strong negative correlation between the terrorist incidents during the past year and the personal disposable income. According to the model in Column 3, a one percent increase in terrorist incidents results in a 0.038 percent decrease in an individual’s income.

In Columns 4 to 6, we present our instrument variable estimates following the same sequence of controls as we applied in Columns 1 to 3. The F statistic for IV estimates ranges from 26 to 29, more than the benchmark criteria cited in the literature (Stock, 2005). These columns contain second-stage results. The coefficients are still negative and statistically significant, which is consistent with Columns 1 to 3. According to the coefficient in Column 6, with full control regression specification, a one-unit increase in terrorist incidents during the past year causes a 4.14 percent decrease in personal disposable income. In other words, a one-unit increase in the past year of terrorist incidents (with an average of 5.42), causes personal disposable income to decrease by approximately 41,400 rupees. Conversely, if no terrorist incidents take place, an individual can earn 4.14 rupees more for every 100 rupees.

Table 4. OLS and IV estimates (Dependent variable: Log personal disposable income)

Variables	OLS estimates					
	1	2	3	4	5	6
Log of past 1 year terrorist incidents	-0.041** (0.018)	-0.032* (0.017)	-0.038** (0.017)	-0.157* (0.093)	-0.185** (0.092)	-0.207* (0.114)
Observations	22,859	22,859	21,853	22,239	22,239	21,233
Wald F statistic				29.47	29.26	26.33
No. of clusters				52	52	52
District Fixed Effects	Y	Y	Y	Y	Y	Y
Year Dummies	Y	Y	Y	Y	Y	Y
Demographic Controls	N	Y	Y	N	Y	Y
Economic Controls	N	N	Y	N	N	Y

Robust standard errors in parentheses, which are clustered at the district level.
 *** p<0.01, ** p<0.05, * p<0.1

Results by Terrorist Incident Type

We present results from two classifications of terrorist incidents in Columns 1 to 4 in Table 5. In Columns 1 and 2, domestic terrorist incidents have a significantly more destructive effect

on personal disposable income compared to transnational terrorist incidents. Transnational terrorist incidents either have no relationship or a very weak causal relationship with personal disposable income. A one-unit increase in domestic terrorist incidents during the past year causes a 3.74 percent reduction in personal disposable income (Column 1). The second classification characterizes suicide and non-suicide terrorist incidents in Columns 3 and 4, respectively. A one-unit increase in non-suicide terrorist incidents during the past year causes a 6.02 percent reduction in personal disposable income (Column 4).

We can see from these estimations that both domestic and non-suicide terrorist incidents are significantly damaging to personal disposable income whereas both suicide and transnational terrorist incidents have little influence on personal disposable income. Our findings are contrary to Khusrav Gaibullov and Todd Sandler (2011). One possible interpretation is that domestic and non-suicide terrorist incidents are more frequent and disturb the normal course of life much more than transnational or suicide terrorist incidents. The value of the F statistics for the IV model in Column 2 is lower than the suggested benchmark of 10.

Columns 1, 3, and 4, all have F statistic values that range from 13 to 29 showing these estimates are reliable. For every million rupees' personal disposable income during the past month, a one-unit increase in domestic and non-suicide terrorist incidents causes a reduction of 37,400 rupees and 60,200 rupees, respectively. Similarly, if no domestic or non-suicide incidents took place, an individual can earn 3.74 or 6.02 rupees more for every one hundred rupees, respectively.

Table 5. Terrorism classification (Dependent variable: Log personal disposable income)

Variables	1	2	3	4
Log of past 1 year domestic terrorist incidents	-0.187* (0.106)			
Log of past 1 year transnational terrorist incidents		0.274 (0.183)		
Log of past 1-year suicide terrorist incidents			-0.188 (0.166)	
Log of past 1-year non-suicide terrorist incidents				-0.301** (0.149)
Observations	21,140	4,899	5,160	20,644
Wald F statistic	29.28	1.782	13.44	19.12
No. of clusters	50	18	20	51
District Fixed Effects	Y	Y	Y	Y
Year Dummies	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y
Economic Controls	Y	Y	Y	Y

Robust standard errors in parentheses, which are clustered at the district level.

*** p < 0.01, ** p < 0.05, * p < 0.1

Results by Demographics

This section shows results by education level, region (rural/urban), business classification, type of organization, and location of the firms. Table 6 Columns 1 to 3 shows the results by different educational levels: no formal education, middle and higher education levels. Individuals having no formal and lower educational levels have their personal incomes significantly more impacted by terrorism. In column 1, a one-unit increase in terrorist incidents during the past year causes a 4.44 percent decrease in personal disposable income of individuals having no formal or lower-level education. In other words, a one-unit increase in the past year terrorist incidents (with the average 5.42), for a million rupees, causes personal disposable income to be lower by approximately 44,400 rupees for those people with lower educated levels. The terrorist incidents have an insignificant impact on the disposable income of individuals with middle and higher levels of education.

Table 6. Education levels (Dependent variable: Log personal disposable income)

Variables	Education levels		
	1	2	3
	No & Lower	Middle	Higher
Log of past 1 year terrorist attacks	-0.222** (0.112)	-0.170 (0.104)	0.474 (0.831)
Observations	8,070	6,399	6,764
Wald F statistic	41.68	23.34	0.326
No. of clusters	52	48	40
District Fixed Effects	Y	Y	Y
Year Dummies	Y	Y	Y
Demographic Controls	Y	Y	Y
Economic Controls	Y	Y	Y

Robust standard errors in parentheses, which are clustered at the district level.

*** p < 0.01, ** p < 0.05, * p < 0.1

In Table 7, we split the sample into organization type (public institution or private sector), business activity (proprietor or other forms of business), location of the firm where the individual works (urban or rural), and occupation type (elementary or non-elementary). We represent results in Columns from 1 to 8 of Table 7. There are significant negative impacts of terrorist incidents only on individuals working in private organizations. The public sector employees have more job security and a lower risk of job losses. If there is persistent terrorism exposure, those in the private sector may lose their business resulting in job losses or lower working hours. A unit increase in terrorist incidents causes a 4.74 percent decrease in the personal disposable income of individuals working in private organizations.

Columns 3 and 4 show the impact of terrorist incidents on the employees' income in different kinds of business organizations. The terrorist incidents only adversely influence the sole proprietorship business types. A unit increase in terrorist incidents causes a 4.82 percent decrease in the personal disposable income of business proprietors. Terrorist

incidents have no significant or very weak impact on the personal disposable income of other forms of business. The sole proprietor is the only person who is responsible for the operation of the business. They are personally liable for any debt. The life of the sole proprietors' business is related to the life of the owner. If the normal course of day-to-day life affects a proprietor's business through any terrorist activity, the proprietor has to suffer the loss by them self.

We present the empirical estimates of the firms' locations in Columns 5 and 6 of Table 7. Column 6 (urban region) shows a unit increase in terrorist incidents that causes a 7.52 percent decrease in personal disposable income of the individuals working in the firms located in urban regions. Most terrorist incidents take place in urban regions therefore firms in the urban region are adversely affected by terrorism. There is very little evidence of terrorist incidents takes place in rural areas hence the impact of terrorism in rural regions is low. Because most of the terrorist incidents take place in urban regions, it is more likely that these incidents will affect adversely the individuals who live and work in urban regions.

Columns 7 and 8 show results by occupation types (elementary and other types of occupations). For non-elementary occupations (Column 8), a unit increase in terrorist incidents causes an 8.06 percent decrease in the personal disposable income for these individuals.

Table 7. Results by Business Characteristics
(Dependent variable: Log personal disposable income)

Variables	Organization type		Business type		Firm location		Occupation type	
	1	2	3	4	5	6	7	8
	Public	Private	Proprietor	Other	Rural	Urban	Elementary	Other
Log of past 1 year terrorist incidents	0.158 (0.165)	-0.237* (0.134)	-0.241* (0.136)	0.171 (0.185)	-0.036 (0.156)	-0.376*** (0.140)	-0.115 (0.128)	-0.403** (0.170)
Observations	12,593	8,023	7,324	13,292	15,489	5,744	5,337	15,896
Wald F statistic	0.894	23.15	21.68	0.902	17.84	14.88	57.17	7.712
No. of clusters	39	52	52	45	50	52	50	52
District Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y
Demographic Controls	Y	Y	Y	Y	Y	Y	Y	Y
Economic Controls	Y	Y	Y	Y	Y	Y	Y	Y

Conclusions

This paper evaluates the causal impact of terrorist incidents on the personal disposable income of individuals in Pakistan. Using 21,853 observations from pooled cross-sectional data from 2001-02 to 2014-15 provided by the Pakistan Bureau of Statistics, our finding

suggests that an increase in terrorist incidents in the past year results in a decrease in personal disposable income of approximately 41,400 Pakistan rupees, for an individual who earns one million Pakistan rupees. In other words, if no terrorist incidents took place, an individual can earn approximately 4 rupees more for every 100 rupees.

To the best of our knowledge, this is the first study that isolates the causal impact of terrorism on personal disposable income. Apart from the baseline estimates, our findings suggest that personal disposable income is influenced by regular and persistent exposure to terrorism. Domestic and non-suicide terrorist incidents are more frequent and impose a greater threat to personal disposable income than transnational and suicide terrorist incidents. This is contrary to the findings of Khusrav Gaibulloev and Todd Sandler (2011). Further analysis of different segments in society reveals some interesting results. The terrorist incidents have a more adverse influence on the income of individuals having no formal or lower education. Terrorism more strongly impacts the income of sole proprietors and individuals working in private organizations and those in non-elementary occupations. As terrorist incidents take place mostly in urban regions, firms located in urban regions have their income more affected than those in rural regions.

Our study proposes policy implications as well as recommendations for future research. For segments of society that are more affected by terrorism, the government should pay more attention to provide them by providing a more secure business-friendly environment. These vulnerable groups need more consideration from the law enforcement agencies to perform their daily activities. If these individuals are overlooked by the authorities, they may sympathize with terrorist organizations. As noted by Muhammad Zakaria, Wen Jun and Haseeb Ahmed (2019), a coordinated regional effort to limit external conflict in neighboring countries may help foster increased personal income and secured livelihoods in Pakistan. The USA's withdrawal from Afghanistan in 2021 may be a step in the right direction if checks and balances are put in place by multilateral partners. At the same time, policymakers in Pakistan can take steps to foster private sector entrepreneurs and small business growth while the Ministry of Defence and the Ministry of States and Frontier Regions concentrate on providing a more secure and safe society. There has been some improvement in recent years in this area, as measured by the World Banks' Ease of Doing Business survey. For 2019, Pakistan is ranked 108 among 190 economies in the Ease of Doing Business rankings. The rank of 108 improved from 136th in 2018, approximately where Pakistan was back in 2012. Future research might examine the longitudinal impact of terrorism on the livelihoods of those living in terrorism-plagued areas.

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