

Inflation: The Macroeconomic Consequence of Terror Activity in Pakistan

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Abstract

This study estimates the impact of terror activity on inflation in Pakistan. Considered as one of the most dangerous places in the world, Pakistan is the epicentre of terror activity since September 11, 2001 (9/11). Apart from casualties of innocent people and damage to infrastructure, there are other macroeconomic consequences of terror as well. Terror activity disrupts the supply-chain and influence consumer behaviour that has implications for inflation. After developing the terror index (TI) which captures the impact of terror activity in Pakistan, Autoregressive Distributed Lag (ARDL) model is used on monthly data starting from January 2002 to October 2023. This estimation strategy provides both the short-run and long-run coefficients and analyses the long-run relationship between inflation and terror index. Traditional determinants of inflation such as money supply, government borrowing from the central bank, nominal exchange rate and a dummy for massive floods are used as 'control' variables in this study to gain improved model fit and address the problem of endogeneity. The results show that the coefficient of terror index is statistically significant both in the short-run and the long-run. A rise in terror activity leads to an increase in inflation. Coefficients of control variables are also statistically significant and in line with economic intuition. The assertion that high inflation or fragile economic conditions may lead to terror activity does not hold for Pakistan as the responsibility of more than 90 percent of the terror incidents is claimed by international terrorist organizations or banned local organizations that function on their own extremist ideology. Reverse causality test validates the proposition that inflation is not a determinant of terror activity in Pakistan.

Keywords: Terror Activity, Inflation, Terror Index, Pakistan

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1. Introduction

The tragic incident of September 11, 2001 – remembered as 9/11 – continues to haunt Pakistan even after more than two decades. Pakistan has been a frontline state in the “global war on terror” since 9/11 (Tellis 2008). On one hand, Pakistan gained recognition of being a key ally of the United States and received monetary benefits in the form of Coalition Support Fund (CSF). On the other hand, the social unrest, financial cost, and the macroeconomic consequences Pakistan faced is far superior. More than 250 terror related events took place in Pakistan during the last two decades. Since the start of October 2001 till June 2018, the total cost estimated is US\$ 127 billion which is greater than the outstanding external debt stock of Pakistan. These costs include compensation to victims, loss of physical infrastructure, decline in tax collection and export revenues etc. However, the macroeconomics consequences of terrorism are beyond the cost estimated above.

Investment, consumption, and income levels decline due to a rise in terror activity. In addition, terrorism also brings the changes in trend and business cycle of the Israeli economy. The number of victims died due to terrorism is about the same size as due to car accidents. However, the damage caused by terrorism leads to a 3 percent decline in annual consumption per capita (Eckstein and Tsiddon 2004). Per capita GDP in the Basque country declines by 10 percentage points after the outbreak of terrorism relative to synthetic control region without terrorism. Furthermore, authors use the 1998-1999 truce as a natural experiment and find that stocks of firms show a positive relative performance when truce became credible and a negative relative performance at the end of the cease-fire. This sort could potentially have an undesirable impact if terrorists learn that their actions affect the economy negatively, assuming that is what they want to do.

A study on Jerusalem house prices reveals that the house prices in the cities impacted by terror activity decreases by 10-12 percent within six months of a shooting event. Nevertheless, impulse response functions indicates that prices revert to their pre-shooting levels within 18 months of the shooting event (Arbel, et al. 2010). The episodes of peace and violence influence the real estate market in Northern Ireland. Political stability is largely associated with positive economic outcomes reflected by high prices in the housing market (Besley and Mueller 2012). Terror activity possesses social and economic implications. Dynamics and costs of crime in a society are influenced by episodes and events of violent incidents (Gould and Stecklov 2009). Similarly, the performance of equity market, foreign exchange market, and other financial markets is impacted by terrorism. Incidents of terrorism can influence both the investor as well as the financial institutions.

A study related to Pakistan establish linkages between inflation, economic growth, and terrorism during the period of 1971-2010. Interestingly, a two-way causality exists between inflation and terrorism (Shahbaz 2013). Just like terrorism, political instability has an impact on Pakistan’s inflation rate. Periods of uncertainty, or political disruptions influence economic conditions of Pakistan.

A glance at the relevant literature indicates that terror activity is not considered as a possible determinant of inflation, particularly in case of Pakistan. Most studies related to Pakistan conclude that Inflation is largely a monetary phenomenon. Apart from missing an important variable like terror activity particularly after 9/11, most studies also fail to address the problem of simultaneity, generally associated with a standard Ordinary Least Squares (OLS) method which would largely yield inconsistent results.

Autoregressive Distributed Lag (ARDL) model is used on monthly data starting from January 2002 to October 2023. This estimation strategy provides both the short-run and long-run coefficients and analyses the long-run relationship between the variables of interest. Traditional determinants of inflation such as monetary growth and government borrowing for budgetary support are controlled variables in this study to gain improved model fit and address endogeneity. A dummy variable for ‘floods’ is also included in this study as a few episodes of massive floods may also have contributed to high inflation. Control variables are also important in this case to capture additional dynamics and potential factors that might influence the long-term and short-term relationships between the variables.

This study is split into following sections: following the introduction in this section, section 2 contains a theoretical framework on how terror activity leads to inflation. In section 3, estimation strategy is explained. Data description and choice of variables are provided in section 4, followed by empirical results in Section 5. The last section gives the conclusion of this study.

2. How Terror Activity May Lead to High Inflation

There are two channels through which the terror activity may contribute to change in inflation. From the supply-side, terror activity may lead to high inflation. The intuition behind this hypothesis is that generally after a terror related incident, protests, strikes, and closure of markets disrupts the supply of daily use items particularly the perishable items (food products which constitutes almost one-third of the overall consumer price index). The government spending also contributes to high inflation. The rise in terror activity forces the government to spend more on defence expenditures and for the law enforcement agencies. Expenditure on defence has increased significantly during the last decades in Pakistan. Similarly, health expenditures also witnessed a surge particularly after 9/11. Compensation to victims also ballooned government expenditures during the period under review. The rise in these expenditures had contributed to higher fiscal deficits. The government has relied heavily on direct borrowing from the central bank during most of the period under review. This deficit monetization (direct borrowing from the central bank) may also have triggered inflation in Pakistan. The changes in the monetization of government debt have a strong impact on domestic prices.

From the demand side channel, the demand for commodities such as furniture, household equipment, vehicles, and health insurances etc. are likely to rise in proportion with the terror related incidents. The house prices particularly in those areas which are relatively immune to terror activity may go up due to higher demand. However, in the case of Pakistan, no specific area is unaffected by terrorism during the last two decades. Another important component of CPI is utility bills. Utility bills are regulated and administrated by the government; hence they are likely to remain unchanged.

The relationship between terror activity and inflation is likely to be positive and a one-way relationship is expected i.e., terror activity has an impact of inflation. Except for few incidents, the responsibility of terror activity in Pakistan is claimed by global terrorist organizations such as the Tehrik-e-Taliban Pakistan (TTP), Al-Qaeda and banned extremist organizations such as Lashkar-e-Jhangvi and Sipah Sahaba.¹ These organizations are largely based on their extreme ideologies. Hence the hypothesis that worsening economic conditions

¹ Source: South Asia Terrorism Portal. www.satp.org.

lead to terror activity is assumed not to be true for Pakistan. A reverse causality check is also performed to test this hypothesis.

3. Estimation Strategy

The Autoregressive Distributed Lag (ARDL) is a widely used modelling framework to estimate one-to-one relationship between the variables of interest. In this methodology, the dependent variable is a function of its lagged values and the current and lagged values of the explanatory variables. The advantage of an ARDL model is that it can accommodate several lag structures. Importantly, this technique provides estimates of short-run and long-run cointegrating relationships even if the variables are not integrated of the same order. However, unit root testing is required to ascertain that no variable is integrated of order 2.

The basic ARDL (p,q₁) model for the estimation of long run relationship between inflation rate and terror activity in this study is as follows:

$$Inf_t = \alpha + \beta_0 TI_t + \beta_1 TI_{t-1} + \dots + \beta_{q_1} TI_{t-q_1} + \theta_1 Inf_{t-1} + \dots + \theta_p Inf_{t-p} + \Upsilon z_t + \mu_t \quad (1)$$

Inf is the YoY inflation rate; TI is the YoY growth in Terror Index; z_t is set of L control variables, μ_t is the error term.

The compact format of (1) is:

$$Inf_t = \alpha + \sum_{i=1}^p \theta_i Inf_{t-i} + \sum_{i=0}^{q_1} \beta_i TI_{t-i} + \Upsilon z_t + \mu_t \quad (2)$$

The model (2) is autoregressive as the inflation rate is explained, in part by its own lagged values. The model contains a distributed lag component as the inflation rate is partly explained by lagged values of the explanatory variable.

To estimate the existence of a long-run relationship, the Bounds test of (Pesaran et al. 2001) is conducted to test the below hypothesis. The Bounds test involves comparing the values of *F*- and *t*-statistics to pairs of critical values. Within the bounds, the test is inconclusive. If the values are outside of these bounds, the test either conclusively rejects or does not reject the null hypothesis.

$$\Delta Inf_t = \alpha + \sum_{i=1}^{p-1} \gamma_i \Delta Inf_{t-i} + \sum_{i=0}^{q_1-1} \delta_i \Delta TI_{t-i} + \lambda_1 Inf_{t-1} + \lambda_2 TI_{t-1} + \varepsilon_t \quad (3)$$

In (3), ARDL short-run coefficients are γ_i δ_i; -λ₁ is the error correction coefficient (the speed-of-adjustment coefficient) and the long-run coefficient is -λ₂/ λ₁. The error correction coefficient shows the speed of adjustment of the inflation rate in response to the change in terror index.

Null Hypothesis: No long-term relationship between inflation rate and terror index.

$$H_0: \lambda_1 = \lambda_2 = 0$$

Alternative Hypothesis: Long-term relationship between inflation rate and terror index.

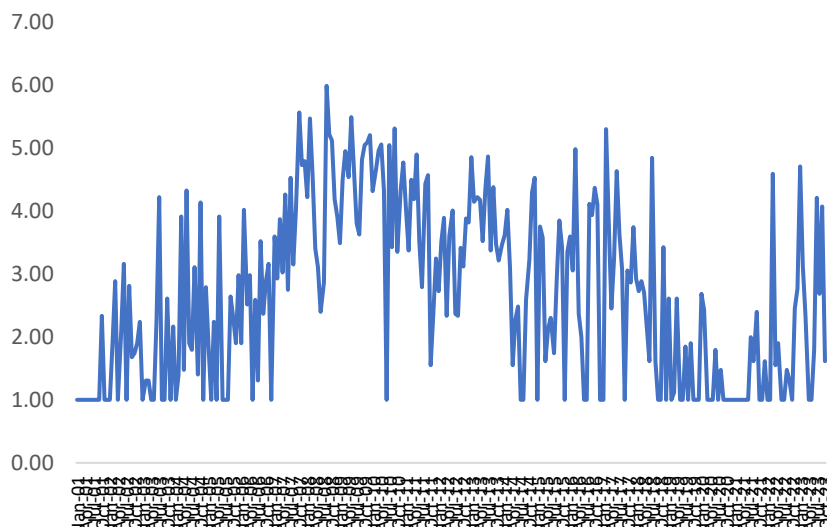
$$H_1: \text{At least one of } \lambda_1, \lambda_2 \neq 0$$

Null hypothesis would be rejected if the value of the F-Statistic is higher than the upper critical bound.

4. Data Description and Choice of Variables

- a. Inflation is the main dependent variable of interest in this study. Year on Year (YoY) growth rate of *Consumer Price Index (CPI)* of monthly frequency is used as a proxy for inflation. CPI is the main measure of price changes at the retail level and measures inflation in Pakistan with monthly frequency. Pakistan Bureau of Statistics (PBS) is responsible for collection, compilation, and presentation of retail/wholesale prices as well as computation of price indices. PBS collects data of prices both from rural and urban areas of Pakistan. 35 cities and 68 markets are covered for computation of CPI. In total, 356 commodities constitute the CPI. PBS staff located in 30 Regional/Field offices collect CPI data regularly on monthly basis. They personally visit shops, stores, and establishments according to a predetermined time schedule and collect the prices from three shops of the selected items from Urban centres and two shops from Rural centres. Prices are reported in schedules specifically developed for the purpose.² Source of this dataset is *Pakistan Bureau of Statistics*.
- b. Terror activity (terrorism) is the main explanatory variable. A particular *terror index (TI)* is developed to capture the impact of terror activity on inflation. For terror index, the logarithm of “e” plus the average of the following is used: (i) the number of fatal victims of terror action, (ii) the number of injured from terror action, and (iii) the number of terror action. A similar index was used for a case study of Israel (Eckstein and Tsiddon 2004). **Figure 4.1** shows the trend of Terror Index of Pakistan since the start of 2001. It is obvious from the trend that during the last two decades, the intensity and frequency of terror activity has not diminished much. Source of this dataset is *South Asia Terrorism Portal*.

Figure 1: Terror Index for Pakistan



² Source: Pakistan Bureau of Statistics; www.pbs.gov.pk.

- c. *Control variables*: Important determinants of inflation often mentioned in the literature and theory are used in this study for multipurpose. Control variables improve model fit and address endogeneity. Control variables are also important to capture additional dynamics and potential factors that might influence the long-term and short-term relationships between the variables.
- d. *Inflation inertia* itself is often considered an important determinant of inflation. One of the benefits of using the ARDL model is that it already contains the one period lagged rate of inflation. One period lagged rate of inflation is a good proxy for inflation inertia.
- e. To address the widely famous claim that ‘inflation is always a monetary phenomenon’, *YoY growth rate of money supply* is also added as one of the control variables. Money supply is one of the main determinants of inflation. Hence, adding this variable (YoY growth of money supply) addresses the potential issue of omitted variable bias. Source of this dataset is *State Bank of Pakistan*.
- f. *Deficit monetization* is also an important determinant of inflation. The government of Pakistan had relied heavily on direct borrowing from the central bank of Pakistan (SBP) to finance its deficit. Direct borrowing from the central bank implies ‘printing of new money’ that has a positive contribution in inflation. As the budget deficit number is available on quarterly basis only, the variable of government borrowing from the central bank is used instead in this study. Source of this dataset is *State Bank of Pakistan*.
- g. *Floods* also contribute to inflation (Mujahid, Malik and Tahir 2016). Pakistan witnessed massive floods (2010-11) and (2021-22) that destroyed the agricultural products and led to supply disruptions which added pressures on inflation. Hence a dummy variable for floods is also used as a control variable in this study. Source of this dataset is various versions of *Economic Survey of Pakistan, Ministry of Finance*.
- h. *Nominal Exchange rate* is also an important contributor to inflation. During the last two decades, different regimes of exchange rate management prevailed in Pakistan. Hence this variable (depreciation/appreciation of exchange rate on monthly basis) is also used as a control variable. Source of this dataset is *State Bank of Pakistan*.

5. Empirical Results

a. Pre-estimation tests:

Before estimating the main model, Augmented Dickey-Fuller (ADF) test is applied to check the presence of a unit root in the series of dependent, explanatory and control variables. The null hypothesis is that the variable contains a unit root, against the hypothesis that the variable is generated by a stationary process. All the series are $I(1)$ i.e., integrated of order one and are cointegrated, which paves the way to estimate the ARDL.

b. Main empirical results:

Main results of equation (3) are provided in Table 1. The long-run coefficient of terror index is statistically significant and with a positive sign. A-100 basis points (bps) increase in the terror index leads to an increase of 8-bps in YoY inflation. The positive sign of this long-run coefficient implies that terror activity leads to high inflation. This is in line with intuition because terror activity is likely to disrupt the supply chain. Interestingly, the short-run coefficient has a negative sign which implies that in the short-run (within a

month), terror activity leads to a fall in inflation. This is perhaps due to fall in demand after a terror activity. A terror activity may compel consumers to stay at home and avoid unnecessary transactions. However, the size of the coefficient is negligible. The coefficient of the speed of adjustment indicates roughly 6 percent of the equilibrium is restored within a month. The coefficients of control variables are also in line with economic institution. The coefficient of exchange rate has a negative sign, which implies that an appreciation (depreciation) of exchange rate leads to fall (rise) in inflation. A rise in the money supply also leads to increase in inflation in line with the quantity theory of money (QTM). Interestingly the coefficient of government borrowing has a negative sign, which shows that deficit monetization has not contributed positively during the sample period in this study. The coefficient of floods is statistically significant.

A reverse causality test (using inflation as explanatory variable and terror activity as dependent variable) reveals that inflation does not lead to terror activity.

Table 1: Main Results

| Dependent Variable | Explanatory Variable(s) | Coefficient | Standard error | p-value |
|--------------------|--------------------------|-------------|----------------|---------|
| | Terror Index | | | |
| | Short-run Coefficient | -0.005 | 0.001 | 0.001 |
| | Long-run Coefficient | 0.082 | 0.038 | 0.032 |
| | Adjustment speed | -0.061 | 0.020 | 0.003 |
| YoY Inflation Rate | Control variables | | | |
| | Nominal exchange rate | -0.043 | 0.016 | 0.009 |
| | Floods | 0.821 | 0.308 | 0.008 |
| | Government borrowing | -0.00001 | 0.00009 | 0.867 |
| | Money supply | 0.070 | 0.039 | 0.078 |

Notes: Total number of observations 262; AIC to choose optimal lag selection. Manual selection of 13 lags provides similar results.

c. Post-estimation tests:

Several post-estimation tests are also conducted for the main model. For instance, structural-breaks testing, serial-correlation testing, heteroskedasticity testing and coefficient stability testing. Overall, results indicate no evidence of misspecification.

Breusch-Godfrey LM test for autocorrelation shows no serial correlation.

To check for coefficient stability, the cumulative sum (CUMSUM) test is also conducted. Breusch-Pagan test and the White's tests indicate that heteroscedasticity is not present, and the results of the main estimation strategy are valid.

Structural-breaks testing using the 'estat sbsingle' command is also done to test for a structural break in the speed-of-adjustment and the long-run coefficients. Results do not indicate any structural break.

6. Conclusion

Terrorism remains a persistent and intense issue for Pakistan since the events of 9/11 after Pakistan became a key ally of the US in the war against terrorism. Primary schools, shopping malls, airports, cricket stadium, police check-posts, hospital, army's head quarter, entertainment parks, shrines, praying areas, public rallies, airports, train stations have been attacked by the terrorist short after September 2001.

Apart from financial and human resource losses, this continuous and indiscriminate wave of terrorism has macroeconomic consequences for Pakistan. This study estimates the impact of terror activity on one of the most important macroeconomic variable 'inflation' using monthly data from January 2002 till October 2023. This estimation is done using ARDL model. Several important control variables are also added in the estimation strategy to improve the overall fit of the model and to address the problem of probable endogeneity. Results suggest that a rise in terror activity leads to high inflation. The coefficient of terror index is statistically significant.

This positive association between the terror index and inflation is expected because after a terrorist incident, supply of daily-use items is disrupted because of strikes, market closures and hurdles in transportation. In a weak price-regulating system, the chances of inflation rates going up increase. Terror activity also brings direct damage to items such as furniture and motor vehicles etc. The demand of these items likely goes up and may also contribute to inflation. Reverse causality test validates that terror activity is exogenous and high inflation rate does not lead to or promote terrorism.

References

- Abadie, Alberto, and Javier Gardeazabal. (2003). "The economic costs of conflict: a case study of the Basque Country." *American Economic Review* 113-132.
- Arbel, Yuval, Danny Ben-Shahar, Stuart Gabriel, and Yossef Tobol. (2010). "The local cost of terror: Effects of the second Palestinian Intifada on Jerusalem." *Regional Science and Urban Economics* 415-426.
- Besley, Tomothy, and Hannes Mueller. (2012). "Estimating the Peace Dividend: The Impact of Violence on House Prices in Northern Ireland." *The American Economic Review* 810-833.
- Eckstein, Zvi, and Daniel Tsiddon. (2004). "Macroeconomic consequences of terror: theory and the case of Israel." *Journal of Monetary Economics* 971-1002.
- Eldor, Rafi, and Rafi Melnick. (2004). "Financial markets and terrorism." *European Journal of Political Economy* 367-386.
- Gould, Eric D, and Guy Stecklov. 2009. "Terror and the Costs of Crime." *Journal of Public Economics* 1175-1188.
- Karatzas, George. (1993). "Government Deficits, Monetization, International Reserve Flows, and Inflation in Selected African Countries." *Economia Internazionale / International Economics* 201-224.
- Khan, Safdar Ullah , and Omar Farooq Saqib. (2011). "Political instability and inflation in Pakistan." *Journal of Asian Economics* 540-549.
- Kripfganz, Sebastian, and Daniel C. Schneider. n.d. "ardl: Estimating autoregressive distributed lag and equilibrium correction models." *In Proceedings of the 2018 London Stata Conference*.
- MOF. (2018). *Impact of War in Afghanistan and Ensuing Terrorism on Pakistan's Economy*. Islamabad: Pakistan Economic Survey 2017-18, Ministry of Finance.
- Mujahid, Noreen, Nargis Malik, and Sheeba Tahir. (2016). "The Macroeconomics of Flood: A Case Study of Pakistan." *Journal of Environment and Earth Science* 67-80.
- Pesaran, M. Hashem , Yongcheol Shin, and Richard J. Smith. (2001). "Bounds testing approaches to the analysis of level relationships." *Journal of Applied Econometrics* 289-326.
- Shahbaz, Muhammad. (2013). "Linkages between inflation, economic growth and terrorism in Pakistan." *Economic Modelling* 495-506.
- Tellis, Ashley J. (2008). *Pakistan and the War on Terror Conflicted Goals, Compromised Performance*. Washington DC: Carnegie Endowment for International Peace.

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