Impact of Protracted Domestic Conflict on Government Investment Incentives; Evidence from Macroeconometric Investment Model of the Kurdish Conflict in Turkey

(Job Market Paper)

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Abstract

Does Protracted Domestic Conflict affect government investment incentives, if so what is the extent of the impact? This paper empirically revisits the relationships between private investment, public investment, and protracted domestic terrorism. This article provides evidence for a particular channel through which sustained domestic terrorism in a conflicted zone may affect investment levels in developing countries. Using province-level panel data during the period of insurgency in Turkey, the benchmark Arellano-Bond GMM Model predicts significant adverse effect of terrorism on the level of private investment in the long-term, but effects are small and insignificant for public investment. The increase in the intensity of domestic terrorism incidents in a province in a year by 10%, reduces long-term private investment by 3.2% percent after controlling for district fixed-effects, time trends, district trends, and other city-level controls. This has resulted in the loss of close to 1.2 billion of investment annually because of the insurgency. Results are robust across a number of alternative specifications and consistent with the findings of Fielding (2003;2004). These negative effects are greater in Kurdish-populated areas and those living in bordering districts.

Prolonged terrorism affects investment levels substantially, so a significant improvement in investment performance will arise not from increasingly draconian security measures–which might reduce fatalities in Turkey, but are likely, if anything, to increase the number of PKK

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casualties–, but only from a long-lasting peace agreement that removes the incentive for violent political conflict.

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JEL classification: N4, H56, D74, E6, O11, 053

1 Introduction

Scholars have debated about the impact of terrorism on the economic progress in developing countries. This study is concerned with the assessment of the consequences of protracted terrorism on investment incentives. Even though terrorism has been persistently recurring all around the world, some countries have been struggling with terrorism for many years, i.e., Columbia, Peru, Turkey, Spain, and the UK. This study explores the economic effects of terrorist activities on investment in developing countries using renowned Global Terrorism Dataset (GTD) and Turkey, which has confronted with a long history of conflicts with PKK and Kurdish insurgency movements, as a case study. The objective of this study is to improve the current understanding of the impact of protracted terrorism on investment in developing countries, through refined specification and time-span. Thus, this paper intends to address the following research questions: Do protracted terrorist activities reduce investment in developing countries? Is there any correlation between private investment and protracted terrorist activities within the country? If any, what is the magnitude and direction of the association?

The hypothesis is that an increase of the intensity of terrorist activities in a conflicted region of the country will damage the economic activity –specifically Public and Private Investment– in that region and drive out the resources to the more secure part of the country. In other words, when a city[2] within the country experiences prolonged terrorist attacks, it attracts less public and private investment. It is expected that terrorism adversely to be related to the investment level for each city. Terror-prone cities will be affected more than other cities. Since terrorism in Turkey

[2] Cities are the units of analysis for this study.

is mostly occurring due to the secessionist demands of the PKK, Kurdish populated city will attract less investment.

The Kurdistan Workers' Party commonly known as the PKK, is a Kurdish organization that has been fighting an armed struggle against the Turkish state since 1978 for an autonomous Kurdistan and cultural and political rights for the Kurds in Southeastern Turkey (Akyol, 2006). PKK has discouraged the business people and local officials to invest in the region, and in the meantime, the government has given massive subsidies and incentives to encourage investment there. Unfortunately, little research has been carried out to assess the economic effects of this conflict and investment (Bilgel & Karahasan, 2015). This study specifically examines the negative economic consequences of terrorist activities of the PKK in Turkey using macro-econometric investment models introduced by Fielding (2003; 2004; 2012), and Powers & Choi (2012), and measures taken by the government of Turkey is combatting terrorism.

This research examines the complex relations between public and private investment and terrorist activity in the conflict areas. Effects of government expenditure, such as education and public infrastructure investment, in conflict zones during the conflicts have different implications since conflicted regions require policy and investment measures taken by both government and private institutions to prevent terrorism. Due to the heightened threat environment in the entire conflicted region, anyone thinking of doing business in that region should keep up with the latest risk threats, which may discourage the potential investors.

To perform the analysis for this objective, this study makes use of a modified growth macroeconeometric investment model introduced by Fielding (2003; 2004). This model provides a generalized formal theory that can account for the differential rates of investment from severe conflicts among conflicting parties at various stages of political and economic development. Specifically, this model anticipates that investment within the country will be affected not only with economic determinant, but also political variables, including terrorism. In addition to assessing the growth patterns of investment, the macroeconometric investment model also formally derives the factors that are influential on investment. By bringing together economic factors (such as GDP per capita, human capital, and, openness), demographic factors (such as population growth), and political factors (such as terrorism), the model can potentially contribute

to the literature with the consistent and comprehensive model it has been lacking. Considering the frequent incidence and severity of terrorism in recent years, and the amount of humanitarian and economic damage that it causes, the inferences of this study are enormous and significant for both academics and policymakers. By providing a sound, universally applicable, and empirically supported framework that links the consequences of terrorism and determinants of investment, this study paves the way for an integrated approach for the reconstruction of terrorism-torn nations.

To test the hypotheses, a panel data on 61 cities in Turkey has been collected between the years 1981 to 2015. Two regions were generated synthetically, by dividing Kurdish-populated cities from the rest of the country. Different specifications are implemented to test the hypothesis. For example, outliers should be taken in consideration because extreme values of observed variables can distort estimates of regression coefficients (Williams, 2016). In one of specifications, three major cities–Istanbul, Ankara, Izmir–have been excluded to address the outlier effect, since three biggest cities attract nearly 27% of private investment, 35% of public investment and 32% of terrorist events, respectively. Building on previous studies on the linkages investment, terrorism and economic growth, this study employ the dynamic panel Arelleno-Bond Generalized Method of Moments (AB-GMM) estimator with the standard choices of instruments in this case with two-step System GMM, Windmeijer-corrected standard errors, small-sample adjustments, and orthogonal deviations with two-lags of instruments. Thus, the system GMM framework allowed this research to model the dynamic aspects of the investment growth process and control for the endogenous nature of many explanatory variables.

The paper is organized as follows. Section 2 provides an overview of the existing literature on the consequences of terrorism and critically evaluates the key arguments, propositions, and findings with regards to economic consequences of terrorism on investment. Section 3 delivers the background information about the Kurdish conflict in Turkey. Section 4 outlines the assumptions of the argument, explains and describes the collection of the data. The research design is presented first, and then, the dependent, explanatory and control variables are described. Afterwards, the descriptive statistics are presented, and finally, the methods are explained. In Section 5, the results, conclusions and implications are discussed. The results are

presented according to the research design. Internal and external validity of the research and recommendations for future studies are presented. Section 7 concludes the study by reviewing the summary of findings, suggestions for potential theoretical and policy implications, and possible extensions of this study the research limitation.

2 Related Literature

The conceptual definition of terrorism is highly controversial in the literature; one should carefully define what terrorism means, since definitions are essential when putting together data to examine propositions, trends, and other aspects of terrorism. This research utilizes the Global Terrorism Database (GTD) for its empirical work, so its definition of terrorism is taken granted. The definition of terrorism employed by the original GTD data collectors was exceptionally broad. The GTD defines a terrorist attack as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation" (LaFree, Dugan & Fogg, 2006; GTD ,2016).

Terrorist attacks may impose a number of significant costs on individuals, societies, and the state, and can substantially change the economic and social structure of the country. The immediate costs of terrorist acts are loss of human lives, destruction of property and infrastructure, and the curtailment of short-term economic activity. Additionally, terrorism can create uncertainty, reduce confidence and increase risk perceptions, leading to lower rates of investment and lower economic growth in the long run (Ali, 2010). Terrorism can impose costs on a country through several industries such as tourism, manufacturing, defense, and airline industries. Terrorist incidents have economic consequences by diverting foreign direct investment (FDI), destroying infrastructure, redirecting public investment funds to security, or limiting trade (Enders & Sandler, 2008). The impact of terrorism upon a country trying to solve the terrorism problem is substantial especially if those countries are developing countries. Some economic consequences of terrorism are shown in Table 1.

Direct costs consist of immediate aftermath of a terrorist incident involving physical destruction, casualties and long lasting treatment, such as chronic injuries and potential psychological traumas. In contrast, indirect costs involve attack- related subsequent losses such

as disruption in the economic process and activities, diversion of foreign direct investment, shift of public investments towards expenditure for security measurements, limitation of trade, increased insurance premiums, higher security costs and greater compensation outlays. Indirect costs consist of microeconomic and macroeconomic impacts (Polat & Uslu, 2013).

Table 1: List of Economic Consequences of Terrorism

Economic Dimension	Effect
Economic growth	Negative, sometimes dramatically falls
Exports	Negative, due to (i) production fall; (ii) shift to domestic sales; (iii) disruptions in international markets
Sectoral distribution	Shift from tradable to non-tradable sectors, due to e.g. the undermining of banks and failure of transport system
Consumption	Negative in spite of reduced domestic savings and increased foreign borrowing and aid
Investment	Sharp fall in government capital formation and private investment, due to budgetary restrictions and increased uncertainty
Budget deficit	Increase, due to increased spending, while revenues do not always fall
Distribution of government Spending	Increased share allocated to the military, making it difficult to sustain social and economic expenditure
Civic entitlements	NGO efforts to provide food and services could in some cases partially compensate for lost public entitlements, while in other cases NGOs were able to do little, as communities disintegrated
Human costs	Heavy human costs-increased infant mortality rates, deteriorating nutrition, health and educational standards, as a result of falling entitlements and war-induced famines
Development costs	Heavy development costs due to destruction of capital and reduced investment.

Source: Steqart & FitzGerald, 2001, pp.230-232[3]

The literature on economics of terrorism has increased substantially after 9/11. A substantial literature review about the economic impact of terrorism can be found in Brück, et al. (2008), Llussá and Tavares (2007), and Schneider, et al. (2010). The economic impacts of terrorism can be accounted for by direct and indirect costs (Brück, et al., 2008, Sandler and Enders, 2008). Many of the papers exploited cross-section country data to examine hypotheses about how terrorism affects aggregate economics and different segment of economy of the countries (see following surveys regarding economics of terrorism: Schenider, Brück and Meierrieks, 2011;

[3] Estimating Conflict Cost: The Case of North West Frontier Province and Pakistan (Draft for Discussion), http://www.cppr.edu.pk/assets/estimating_conflict_cost.pdf

Brück, 2007; Mesquita, 2008; Abadie and Gardeazabal, 2008; Enders and Sandler, 2006). While different papers find different socio-political indicators to be significant using different approaches, there is a consensus that economic growth and investment levels are highly affected by the political climate of a given country.

Over time, the impact of both political and institutional factors on the rate of economic growth has received noticeable attention in the economic literature. It is only recently that more systematic attempts were made to analyze the importance of political and institutional factors in explaining cross-country variances in economic growth. Lately, also the issue of political instability and economic growth has also been investigated by a number of scholars (Schenider, Brück and Meierrieks, 2011). Most empirical studies point to political instability as an important obstruction for economic growth, since political instability reduces the supply of both capital and labor. Investment is discouraged due to the increased risk of capital loss, and political turmoil causes capital flight and migration of skilled labor. Political unrest also hinders the establishment of property rights, which affect economic transactions (see Barro, 1989; Fosu, 1992; Haan and Siermann, 1996).

More precise estimates of the impact of terrorism on the economy can be gathered from the studies on long-standing terrorist conflicts. Such studies have taken two forms: focusing either on specific types of economic activity or on the economy of a specific country. For example, Abadie and Gardeazabal (2003) argue that terrorism affects the allocation of investment capital by increasing risk and decreasing expected returns. Their estimates indicate that increased terrorism risk in a country significantly decreases foreign direct investment in that country. Enders and Sandler (1996) also find large negative effects of terrorism on foreign direct investment in Greece and Spain. Similarly, Enders, Sandler, and Parise (1992) find that terrorism significantly has reduced tourism in Greece, Italy, and Austria. Eckstein and Tsiddon (2004) employed an intervention-style time series methodology to study the effects of terrorist attacks on the Israeli economy. They find that terrorism depresses growth, but that the effects of any given attack are relatively short lived. As noted above, political instability as well as terrorism has been generally viewed as lowering economic growth by raising uncertainty and by reducing the quality of economic policy formulation (Fedderke & Klitgaard, 1998).

Several economists have used cross-country data to directly explore the link between the level of investment and political problems such as terrorism, violence, protest, etc. As it is expected, authors find a negative relationship between economic variables and terrorism, but there is no consensus about the appropriate econometric model and different measurement of political variables that should be included in the model. To name a few studies; Alesina and Perotti (1993) created a social-political instability index using principal components and analyzed cross-country investment performances. They find that socio-political instability depresses investment and a rich middle class reduces socio-political instability. Barro (1991) adds the frequency of coups d'état and the number of political assassinations in his growth country regression model as a political variable and finds that they negatively influence growth. Alesina, Ozler, Roubini and Swagel (1996), Blomberg (1992) find an inverse relationship between political instability and growth or investment, using different techniques, approaches and data. Venieris and Gupta (1986) identify an inverse relationship between political instability and the savings rate. Svensson (1998), in his political-economy model finds that unstable political structure leads to lower levels of domestic investment. He contributes to the literature by identifying quality of property rights as the linkage between political instability and investment.

Collier (1999) investigated the consequences of political instability, in his case civil wars, for GDP and its composition including composition investment portfolio. His study sheds light on how political instability can deteriorate the economic structure within the country. In his panel regression, political instability variable has a strongly negative effect on the ratio of investment to GDP. These causes can be mirrored to pro-tracted terrorism. As pro-Kurdish notables, veteran journals who reports from the conflicted zone and some retired officers confessed, the fight in Turkey –looking at its scale and longevity– is "unnamed civil war" (Zurcher, 2003; Sonmez, 2012; Ekinci, 2013; Akyol, 2006; Aydin & Emrence, 2015), so the framework developed by Collier (1999) fits into this research. Theoretically, Collier's (1999) study enumerates five different ways that civil war can affect the economy of conflicted areas which will be applied in this research to terrorist activities in Turkey. Collier (1999) found that political instability and the threat of civil war affect not only aggregate investment but also the composition of investment. In a risky environment, the demand for fixed capital goods may be particularly low, because these are not

physically portable and cannot be shipped out to another area if there is a major breakdown in civil society. Some traded capital goods are more mobile, and therefore less of a risk. The sector intensive in capital and transactions (manufacturing), and the sectors that supply capital (construction) and transactions (transport, distribution, and finance), contract more rapidly than total investment. The sector with opposite characteristics (arable subsistence agriculture) expands relative to GDP. This study evaluates the composition of public investment and how different sectors behave in the midst of terrorism. The magnitude of impact of terrorism can also vary across industries. Some specific industries are more vulnerable than others such as transportation, tourism and insurance (Sandler and Enders, 2008; Strauß, 2001).

The macroeconomic impacts of terrorism can affect a targeted economy through various mechanisms. Terrorist incidents can adversely influence trade (Blomberg and Hess 2006, De Sousa, et al. 2010, Fratianni and Kang 2006, Mirza and Verdier 2006;2008, Nitsch and Schumacher 2004, Suder, 2004, Walkenhorst and Dihel, 2002) and tourism (Drakos and Kutan, 2003, Enders, et al. 1992, Greenbaum and Hultquist, 2006, Karagöz, 2008); increase the spending on defense (Eckstein and Tsiddon, 2004, Gupta, et al., 2004) and public security spending (Brück, 2005); divert domestic and foreign direct investment (Abadie and Gardeazabal, 2008, Enders and Sandler 1996, Fielding, 2003, 2004); discourage employment (Fielding, 2003); divert resources from investment to government expenditure (Blomberg, et al., 2004); adversely affect overall economic growth (Abadie and Gardeazabal, 2003, Blomberg, et al., 2004, Crain and Crain, 2006, Eckstein and Tsiddon, 2004, Gaibulloev and Sandler, 2008, Tavares, 2004); and, negatively affect average returns on stock markets (Chen and Siems, 2004, Eldor and Melnick, 2004).

It is crucial to estimate indirect costs of terrorism to realize the extent of the economic impact of terrorism and determine policies to allay the macroeconomic and microeconomic impacts of terrorism, especially in countries like Turkey, which have been combatting terrorism almost half a century. This study investigates impacts of terrorism on investment and the affects in conflicted zone in Turkey by using data on the political and economic variables for the period between 1970 and 2015 at the provincial level by conducting macroeconometric investment methodology. The unique aspect of this study is the time period –between 1970 and 2014 –, which is the longest time span in comparison with other studies about Turkey, or any other countries, that investigate

the impact of terrorism on growth at the provincial level. In addition, this study is the first to investigate the impact of terrorist attacks on local economic activity by analyzing the effects of public and private investment.

Econometric evidence on individual countries using panel data can give more concise results especially for some developing countries which struggles every phase of political instabilities. Fielding (2003) argues that the potential value of econometric evidence on individual countries using time-series data would be very high since the causal link between political and economic performance is not homogeneous throughout the world. In other words, terrorism will affect investment of countries on different level. As explained above, developed countries are less affected than terrorism, whereas developing countries are affected in higher rates. Even within developing countries, terrorism should have heterogonous effects since those countries has different political, economical and sociological structure; thus, focusing on case studies to deeply analyze the effect can give us invaluable information that public policy makers must consider. Within this context, Turkey is a unique case because it has long history of terrorism with Kurdish conflict and has recently encountered ISIS-type terrorist attacks; it has distinctive role for developing markets and one of the prominent figure among the Muslim countries. Kurdish conflict has been associated with an increase in political instability for Turkey that may well have depressed public and private investment demand. Thus, this research benefits from existing studies on the perception of political uncertainty in Turkey to motivate the calculation of time-varying quantitative measures of terrorism, which have been extracted from the GTD Database. These measures, including an index of terrorism, will be nested in an investment model of Turkey. This study hopes to quantify public and private aggregate investment to changes in the degree of terrorism.

Although Turkey has been struggling with terrorism for decades, there are few studies exploring impact of terrorism on the economy, either at the national and regional level. Emhan (2011) investigated the impacts of terrorism and violent incidents on the entrepreneurs, economy and companies in a field study in Diyarbakir –one of the leading provinces of Turkey in terms of its exposure to terrorism and violence for long periods of time–by employing a survey to gather data from the business owners. The results of this study show that the ongoing terror

and violence in the region since the beginning of the 1980s has had negative effects on the entrepreneurs and the economic development of the city.

Öcal and Yildirim (2010) study the effects of terrorism on economic growth across provinces of Turkey for the period of 1987–2001 by using geographically weighted regression (GWR). While the traditional convergence analysis reveals that terrorism hindered economic growth, the provincial effects of terrorism are found to be more evident in the Eastern provinces. Karagöz (2008) investigate the impact of terrorism on a specific sector in Turkey using structural unit root tests. The results show that impact of terrorism on tourist arrivals has been significantly negative during two separate periods. Araz-Takay, et al. (2008) explore the possible relationship between political conflict and economic activity in Turkey by using linear and non-linear models. The results reveal significant negative impact of terrorism on economic activity. Economy is affected significantly by terrorist incidents during expansionary periods, while terrorism is affected by economic activity more severely during recessionary periods. Öztürk and Çelik (2009) examine the negative effects of terrorism on Turkish economy and society by using descriptive statistics of terrorism and indicators of investment, agriculture and tourism.

3 History of the Kurdish Conflict in Recent Turkey

The Turkish government defines the PKK (Kurdistan Workers' Party), as a Kurdish organization which has since 1984 been fighting an armed struggle against the Turkish state for an autonomous Kurdistan and cultural and political rights for the Kurds in Turkey. In order to finance its operations, PKK has used killing, kidnapping, extortion, robberies, drag and human trafficking. One of the most effective methods of PKK is that threatening the business people to not invest in conflicted areas where the government has immense subsidies such as direct money transfer, low tax.

There are no official and reliable statistics on the number of the Kurds in the Turkey. Most Kurds trace their origins to the impoverished southeast of the country, which still is predominantly Kurdish, but many have migrated to major urban centers elsewhere. The Ethnic Kurds constitute 15 to 20% of Turkey’s population according to Zanotti (2012). They are largely concentrated in urban areas and the relatively impoverished southeastern region of the country,

but pockets exist throughout the country. Kurd's reluctance to recognize Turkish state authority, harsh Turkish measures to suppress Kurdish identity, quell the rights-based claims and demands have fed tensions between them that have periodically worsened since the beginning of the Republic in 1923. The Turkish military has waged an on-and-off struggle to put down a separatist insurgency and urban terrorism campaign by the PKK since 1984.

The initial secessionist demands of the PKK have since evolved into a less ambitious goal of greater cultural and political autonomy. The struggle between Turkish authorities and the PKK was most intense during the 1990s, but resumed in 2003 after the U.S.-led invasion of Iraq, following an intervening lull. According to the U.S. government, the PKK partially finances its activities through criminal activities, including its operation of a Drug trafficking network that spans the European continent.

According to the State Department's Country Reports on Terrorism for 2009, the PKK maintains a regular fighting force of approximately 4,000-5,000 militants. Of those, 3,000-3,500, including the organization's military leadership, are thought to be concentrated in the Qandil Mountains of northern Iraq. The PKK has a branch dedicated to attacks on military targets in southeastern Turkey and a branch dedicated to attacks (primarily bombings) in urban, primarily tourist areas in western Turkey.

Estimates of casualties from The Turkish government-PKK violence since 1984 range from 32,000 to 45,000 (including armed combatants and civilians on both sides), the majority of whom were killed during the 1990s (Zanotti, 2011). Hundreds of thousands of Kurdish villagers in southeastern Turkey have been displaced as a result of the violence, and Kurdish human rights grievances persist.

4 Research Design and Data

4.1 An Integrative Model of Investment

For the theoretical framework, this study follows the distinguished study by Fielding (2003, 2003, 2004); Fielding & Shortland (2012); Powers & Choi (2012). Fielding (2003, 2003, 2004). Fielding & Shortland (2012) constructed a model of investment that incorporates both standard

economic factors and indicators of political instability and unrest. Fielding (2003) estimated a model of investment and disaggregated investment into non-residential construction and machinery and equipment. His model is based on a standard economic representation of a profit-maximizing firm, and incorporates time series reflecting the degree of political instability during the conflict era.

Fielding (2003) derives a theoretical economic model[4], based on the profit-maximizing behavior of a representative firm, which relates gross investment in (i) non-residential construction, B, and (ii) machinery and equipment, M, to economic conditions. The form of the relationship is;

$$\begin{aligned}\ln\left(I^i\right)_t = {} & b_0^i + b_1^i \ln\left(C\right)_t + b_2^i \Delta\ln\left(C\right)_t + b_3^i \ln\left(P^B\right)_t + b_4^i \ln\Delta\left(P^B\right)_t + b_5^i \ln\left(P^M\right)_t \\ & + b_6^i \Delta\ln\left(P^M\right)_t + b_7^i \ln\left(W\right)_t + b_8^i \Delta\ln\left(W\right)_t + b_9^i \ln\left(Y\right)_t + b_{10}^i \ln\Delta(Y)_t \\ & + \sum_\tau g_\tau^i \ln\left(I^B\right)_{t-\tau} + \sum_\tau h_\tau^i \ln\left(I^M\right)_{t-\tau} + f_1^i ISRK_t + f_2^i ALLK_t \\ & + f_3^i \Delta\ln\left(CWBG\right)_{t-4} + f_4^i LABIN_t + f_5^i OSLO_t + f_6^i LABOIUT_t + \mu_t^i\end{aligned}$$

$i = B, M;\ b_1^i, b_3^i, b_5^i, b_7^i < 0 < b_9^i$ **Equation 1**

where

I_t^i is gross investment in each type of capital in period t,

C_t^i the real interest rate (adjusted for capital depreciation),

P_t^i the real purchase price of capital goods of type i,

W_t the real wage rate,

Y_t the output level of the average firm,

and u_t^i an i.i.d. residual. The intercept b_0^i may have a seasonal component

This model states that investment will depend negatively on costs and positively on aggregate output. The lower past investment in one type of capital will tend to depress investment in the other type, ceteris paribus. Fielding (2003) estimates the final investment equations that allow for the political factors that are relevant to the country's economics. In addition, Fielding (2003)

[4] Please refer appendix part of Fielding (2003) for the derivation of the full model.

evaluates the extent to which political instability and unrest have depressed investment in the economy, and seeks to determine whether these factors have influenced different sectors.

The Macroeconometric Investment model for Turkey including political variables as;

$$\ln (Investment^{k})_{t,i} = b_{0,i}^{k} + b_{1}^{k}\ln(Investment^{k})_{t-1,i} + b_{2}^{k}\Delta\ln (Investment^{M})_{t,i} + b_{3}^{k}TerrorismIndex_{t,i} + b_{4}^{k}TerrorismIndex_{t-1,i} + b_{5}^{k}\ln (P^{M})_{t,i} + \mathrm{b}_{6}^{k}\ln\Delta (P^{M})_{t,i} + b_{7}^{k}\ln (W)_{t,i} + b_{8}^{k}\ln (Market\ Size)_{t,i} + b_{9}^{k}\ln(Economic\ Growth)_{t,i} + b_{10}^{k}\ln (Population)_{t,i} + b_{11}^{k}(Economic\ Openness)_{t,i} + b_{12}^{k}(Geography)_{i} + b_{13}^{k}(Human\ Capital)_{t,i} + b_{14}^{k}(Socioeconomy)_{t,i} + v_{i}^{k} + \mu_{t,}^{k}$$

Equation 2

where

$k = B, M\ ;\ B\ is\ Private\ investment\ Incentives; M\ is\ Public\ Investment,$

$\varepsilon_t^i = v^i + \mu_t^i$ and i.i.d. residual. Composite error disturbance term has two orthogonal components: the fixed effects, v^i and the idiosyncratic shocks, μ_t^i.

$(Investment^{k})_{t,i}$ is total annual investment for each investment type.

$(P^M)_t$ the real purchase price of public investment, calculated from deflator for public investment.

$(W)_t$ the real wage rate.

4.2 Main Variables of interest

Private Investment, the dependent variable, comes from the Ministry of Economics' database (2016) and it represents investment incentives given by the government in Turkey. The government of Turkey provides investment incentive schemes, aiming to reduce the current account deficit, ensure production of goods that are subject to high rates imports in the country, production of the products occupy an important place in the value chain, providing increase of added value and the competitiveness, technology transfer, lack of funding or skill of local capital in particular infrastructure investment, provide employment for citizens living in the country. The

incentives also target to eliminate of inter-regional inequality and encourage large-scale investments that will increase the international competitiveness and have high content technology with research and development (Erdogan & Atakli, 2012). The Private Investment data is converted to natural log form to mitigate the possibility of positive skew and to reduce the impact of influential observations.

Public Investment, the dependent variable, comes from Ministry of Development database where data source named as distribution of public investment by province, and it represents total annual investment allocated by the central government in Turkey. This value excludes municipal or any local public agency's investments. The raw data is in Turkish lira; I converted all values to U.S. dollar by exchange rate published in the same source and adjusted for 2015 Prices. The data includes public investment in 9 different sectors and Total Public Investment.

The Terrorism Database of Turkey, the independent variable, is extracted from the Global Terrorism Database (GTD) for Turkey between 1970-2015. The year 1993 is missing in the database. I added missing data for 1993 by consulting Milliyet newspaper archive and Internet search motors such as Google, and I verified my research using other news sources such as Cumhuriyet and Hürriyet Newspaper Archives. Some city names are not correct within the database, remedied by city name. After corrections, there were 4,192 terrorist attacks between 1970 and 2015 in Turkey. For empirical model mentioned later, this study converts the database to the annual and city level. Some cities have been merged because some cities have not existed during the time. Finally, the terrorism index for each city and Turkey are created and merged to the final data with other variables.

4.3 Control variables

4.3.2 Economic Variables

To minimize the possibility that the results are subject to omitted variable bias and thus flawed, the study considered a variety of control variables that encompass economic, political, and systemic determinants of Investment: market size, economic growth, economic openness, lagged Investment, political and socio-economic variables and other variables suggested in the literature.

The first economically-oriented control variable included in this study is a city's market size. Larger cities are likely to attract more investment since investors can assume they will receive more future returns on their investments (Li & Resnick, 2003; Powers&Choi,2012). Smaller markets, by contrast, are less able to provide a favorable climate in which investments can grow. This variable is measured by the natural log transformed gross domestic product (GDP) of a city and is expected to increase investment. I also added a population variable of the city that also can signify the market size of the city. I combined Karaca (2004) and TUIK (2016) population data to get historical data.

Economic growth rate can be a signal for potential investors who seek lucrative business opportunities (Schneider & Frey, 1985). In addition to GDP, adding GDP growth rate is a common approach within the literature as a proxy for growth rate. GDP data by city level is not available for the time span between 1981-2015 in Turkey. I combined Karaca (2004) and the TUIK (2016) database regarding GDP city level. Data between 2004-2014has been extracted from the Turkish Statistical Institute and coupled with Karaca (2004), which includes data between 1981-2001; I rescaled the two series since they have a different base year.

Per Abadie & Gardeazabal (2008), the level of (FDI) within a country also depends on the degree of the country's openness to capital mobility. Previous studies have shown that countries that engage in more international trade also have the tendency to attract more FDI (Büthe & Milner, 2008). Similarly, investment decisions within the country tend to have the same patterns– the more open to trade, the more the city will attract the investment. To measure this variable, I use the economic openness measured as the volume of trade (exports plus imports) as a percentage of GDP (Heston, Summers & Aten, 2009). This variable should have a positive influence on investment.

Another economic control variable in this analysis is the lagged value of logged Investment. This variable is particularly important for our analysis, since Investment data can be prone to autocorrelation (Aisbett, 2007). The addition of this variable should mitigate this problem while also controlling for the effect of omitted structural variables (Li & Schaub, 2004; Powers & Choi, 2012). This variable should have a positive effect upon investment.

The relative cost of investment is another determinant of investment-conflict equation economic. We capture this effect by adding deflator for currency. That shows the relative strength of domestic currency against other currencies. If the Turkish lira is strong, that means potential investors and government will choose to invest actual physical investment instead of investing in other currencies which are very common in developing countries. This variable should have a positive effect upon Investment.

Employment data is also a sign of economic activity within the region. I use unemployment rate, real wage rate, and labor force participation rate in the model as suggested by macroeconomic investment models.

4.3.3 Socioeconomic and Political Variables;

Economic variables are not the only determinants of Investment. Socioeconomic structure of the cities and political variables also can affect the investment decisions of agents. For instance, previous studies dealing with political risk have found that conflict-related variables have an adverse effect upon FDI by bringing about governmental policies that are detrimental to international business interests (Blomberg & Mody, 2005; Li, 2006). I include emergency variables that track whether there is emergency law within the city due to the conflict, which may have an unfavorable effect on investment. Many Kurdish provinces were under army or emergency rule from 1980 until the early 2000s. In 2015, the state declared special security zones in 13 provinces, which is a different version of the emergency rule. Emergency Data between 1983-2011 is received from Tezcur (2015) and I merged recent emergency data with Tezcur (2015). Urbanization data shows urbanization rate of cities. Data for both these variables come from TUIK (2016) and Tezcur (2015).

The Geostructure of the city can affect the investment considering the high altitude and geographically challenging climate of eastern Turkey, therefore altitude of the cities is included in the regressions. This study also examined other variables, such as forestry ratio, distance from capital city, and weather conditions of the cities; but, they were not included in the regressions due to multicollinearity issues. Another political-related factor in predicting investment is the social structure of the cities. I added university degree rates for a proxy of human capital, which

comes from TUIK (2016); The Kurdish population ratios may affect the conflict since main recruitment of the PKK originates from Kurdish people. The estimated proportion of the Kurdish population comes from Mutlu (1995). Lastly, certain characteristics of the years also need to be considered when studying the determinants of Investment. Following the literature, a year dummy is created to capture the year-to-year variations of investment opportunities and conflict.

This study has also considered other variables for the robustness of the study, such as distance from the capital city, netmigration, rebellion data, village evacuation data, the number of new business and closed business, election data, inflation and the interest rate for the regressions. Some variables are not available on a city level, and others are not significant in all models considered, so they are dropped from the models.

Table 2 below displays the descriptive statistics for a selected number of socio-economic and demographic indicators and the intensity of terrorist activity for Turkey and three different subcategories. On average, Kurdish-populated areas receives less public and private investment, while terrorism mostly occurs in these regions. Terrorism occurs nine times more in the eastern part of Turkey. A noteworthy fact in these comparisons is that the eastern and southeastern Anatolia cities have systematically lower per capita GDP, productivity, growth rate, and lesser educational completion rates compared to the rest of the country.

There are total of 4,192 terrorist incidents reported in the dataset for Turkey. The number of terrorist incidents is used as a variable in most studies (Frey, et al., 2007). However, this approach can lead to biased results, since the impact of each terrorist attack has a different magnitude. Following Eckstein and Tsiddon (2004), a simple modified index of terror outcomes in Turkey is constructed in this study. In addition to the previous version of the index, I also added Property loss of Terrorist attack because, in some cases, the event resulted in no casualties but property loss. This approach would give us more realist description of quarterly data for terrorism incident in Turkey.

$$TERRORISM\ INDEX_{i,t-m} = e + \{Incident_{i,t-m} + Killed_{i,t-m} + Wounded_{i,t-m} + PropertyLoss_{i,t-m}\}/4 \qquad \textbf{\textit{Equation 3}}$$

Table 2: Descriptive Statistics of All Variables

Summary Statistics[d]

Variables[a]	Observation	Mean	Std. Dev.	Min.	Max
Private Investment[b]					
Total	**1035**	**6.46E+08**	**3.24E+09**	**0**	**5.07E+10**
Istanbul-Izmir-Ankara	45	2.00E+09	2.30E+09	3.51E+08	1.28E+10
Kurdish	255	87959489	1.60E+08	0	1.09E+09
Non-Kurdish	705	2.77E+08	5.87E+08	0	1.09E+10
Public Investment[c]					
Total	**2403**	**3.56E+08**	**1.84E+09**	**607142.86**	**2.78E+10**
Istanbul-Izmir-Ankara	105	7.62E+08	5.96E+08	1.21E+08	2.75E+09
Kurdish	592	63393440	94000376	2281250	8.66E+08
Non-Kurdish	1638	67976709	76802195	607142.86	4.86E+08
Terrorism Index					
Total	**2415**	**7.30E+00**	**3.92E+01**	**2.72**	**1.43E+03**
Istanbul-Izmir-Ankara	105	13.85333	22.82382	2.72	113.47
Kurdish	595	9.193748	20.55261	2.72	224.22
Non-Kurdish	1645	3.032462	1.851878	2.72	37.97
#Casualties					
Total	**2415**	**1.34E+01**	**1.24E+02**	**0**	**4.85E+03**
Istanbul-Izmir-Ankara	105	26.68571	62.21416	0	408
Kurdish	595	20.01849	68.94771	0	817
Non-Kurdish	1645	0.9270517	6.306123	0	136
GDP					
Total	**1972**	**1.17E+10**	**6.33E+10**	**72300000**	**9.52E+11**
Istanbul-Izmir-Ankara	87	5.90E+10	7.30E+10	6.64E+09	2.94E+11
Kurdish	493	1.75E+09	1.86E+09	7.23E+07	9.68E+09
Non-Kurdish	1363	4.07E+09	5.26E+09	1.57E+08	3.82E+10
GDP Per Capita					
Total	**2380**	**3.85E+03**	**3.38E+03**	**315.7813**	**2.06E+04**
Istanbul-Izmir-Ankara	105	6367.345	4482.918	1635.896	16785.73
Kurdish	595	2405.335	2217.112	315.7813	11268.76
Non-Kurdish	1645	4186.418	3446.248	559.6379	20571.65
Growth Rate					
Total	**1904**	**9.81E-02**	**2.12E-01**	**-0.517755**	**2.57E+00**
Istanbul-Izmir-Ankara	84	0.1123423	0.2563655	-0.3141182	1.518563
Kurdish	476	0.1077123	0.2186414	-0.3188181	1.394087
Non-Kurdish	1316	0.0935403	0.2066165	-0.517755	2.568417
Openness					
Total	**2380**	**1.41E-01**	**2.09E-01**	**0**	**1.42E+00**
Istanbul-Izmir-Ankara	105	0.6142743	0.4151143	0.1466	1.4175
Kurdish	595	0.0323923	0.0427676	0	0.4011
Non-Kurdish	1645	0.1424257	0.1749712	0.001	0.9675
Labor Force Participation Rate					
Total	**437**	**4.97E+01**	**6.52E+00**	**26.9**	**6.63E+01**
Istanbul-Izmir-Ankara	18	48.03056	4.235499	39.85	55.9
Kurdish	102	44.15	7.653025	26.9	60.3
Non-Kurdish	282	51.65508	5.190404	36.9	66.3
Unemployment Rate					
Total	437	9.64714	3.729311	4.2	22.95
Istanbul-Izmir-Ankara	18	13.05	2.549856	9.1	17.3
Kurdish	102	11.87712	4.498519	4.833333	21.76667
Non-Kurdish	282	8.706147	3.178281	4.2	22.95
Real Wage					
Total	2415	391.4787	295.1715	70.9507	1240.964
Istanbul-Izmir-Ankara	105	447.4169	346.1985	76.75444	1240.964
Kurdish	595	362.8972	272.7076	70.9507	944.4828
Non-Kurdish	1645	395.068	295.9737	70.9507	1005.766
Literacy					
Total	**2380**	**8.41E+01**	**1.04E+01**	**47.56**	**9.86E+01**
Istanbul-Izmir-Ankara	105	91.7899	3.842733	85.42	98.19
Kurdish	595	74.57592	13.11466	47.56	95.17
Non-Kurdish	1645	86.9874	6.816501	68.88	98.61
University					
Total	**2380**	**3.16E+00**	**3.71E+00**	**0.0004**	**1.72E+01**
Istanbul-Izmir-Ankara	105	5.478037	4.810206	0.4066	17.16
Kurdish	595	2.212344	3.236579	0.0004	16.66
Non-Kurdish	1645	3.356095	3.704913	0.0224	17.2
Urban					
Total	**2380**	**5.45E+01**	**1.40E+01**	**22.97**	**9.97E+01**
Istanbul-Izmir-Ankara	105	80.79219	6.468745	65.64	92.7
Kurdish	595	50.79775	11.44155	23.31	75.4
Non-Kurdish	1645	54.17064	13.51976	22.97	99.7
Kurdish Ratio					
Total	**2380**	**1.63E+01**	**2.54E+01**	**0.02**	**8.95E+01**
Istanbul-Izmir-Ankara	105	6.026667	0.7658601	5.05	6.91
Kurdish	595	54.98412	23.46412	16.22	89.47
Non-Kurdish	1645	2.969574	3.415061	0.02	15.37
Forestry					
Total	**2380**	**3.11E-01**	**1.77E-01**	**0.01**	**6.80E-01**
Istanbul-Izmir-Ankara	105	0.3533333	0.1593657	0.14	0.52
Kurdish	595	0.1570588	0.1008913	0.01	0.33
Non-Kurdish	1645	0.3646809	0.1687365	0.01	0.68
Altitude					
Total	**2380**	**6.72E+02**	**5.39E+02**	**2**	**1.89E+03**
Istanbul-Izmir-Ankara	105	294.3333	371.5431	2	816
Kurdish	595	1226.118	401.5517	547	1890
Non-Kurdish	1645	495.227	449.3523	3	1390
Borderiis					
Total	**2380**	**1.85E+00**	**3.54E-01**	**1**	**2.00E+00**
Istanbul-Izmir-Ankara	105	2	0	2	2
Kurdish	595	1.588235	0.4925671	1	2
Non-Kurdish	1645	1.957447	0.2019089	1	2
Emergency					
Total	**2380**	**1.88E-01**	**3.82E-01**	**0**	**1.00E+00**
Istanbul-Izmir-Ankara	105	0.0857143	0.2812843	0	1
Kurdish	595	0.410084	0.4650033	0	1
Non-Kurdish	1645	0.0975684	0.2950218	0	1
Defcurrency					
Total	**2415**	**2.70E-01**	**3.22E-01**	**0.000024**	**1.00E+00**
Istanbul-Izmir-Ankara	105	0.2700545	0.3237097	0.000024	1
Kurdish	595	0.2700545	0.3224356	0.000024	1
Non-Kurdish	1645	0.2700545	0.3222625	0.000024	1
Population					
Total	2380	1874193	7764744	76699	7.87E+07
Istanbul-Izmir-Ankara	105	5680818	3414537	2039686	1.49E+07
Kurdish	595	615219.3	366926.8	76699	1892320
Non-Kurdish	1645	770897.4	524857.4	149656.8	2886832
Socio-Economic Index					
Total	2380	0.6886072	0.7541789	0.00639	4.87902
Istanbul-Izmir-Ankara	105	3.541448	0.9644398	1.9715	4.87902
Kurdish	595	0.8139068	0.3911393	0.0103	1.7329
Non-Kurdish	1645	0.473992	0.3601039	0.00639	1.94329

[a] I have also considered other variables such as distance from capital city, netmigration, rebellion data, village evacuation data, number of new business & closed business, election data, inflation,interest rate. Some variables are not available in city level and others are significant in all models considered so I dropped them from the models.

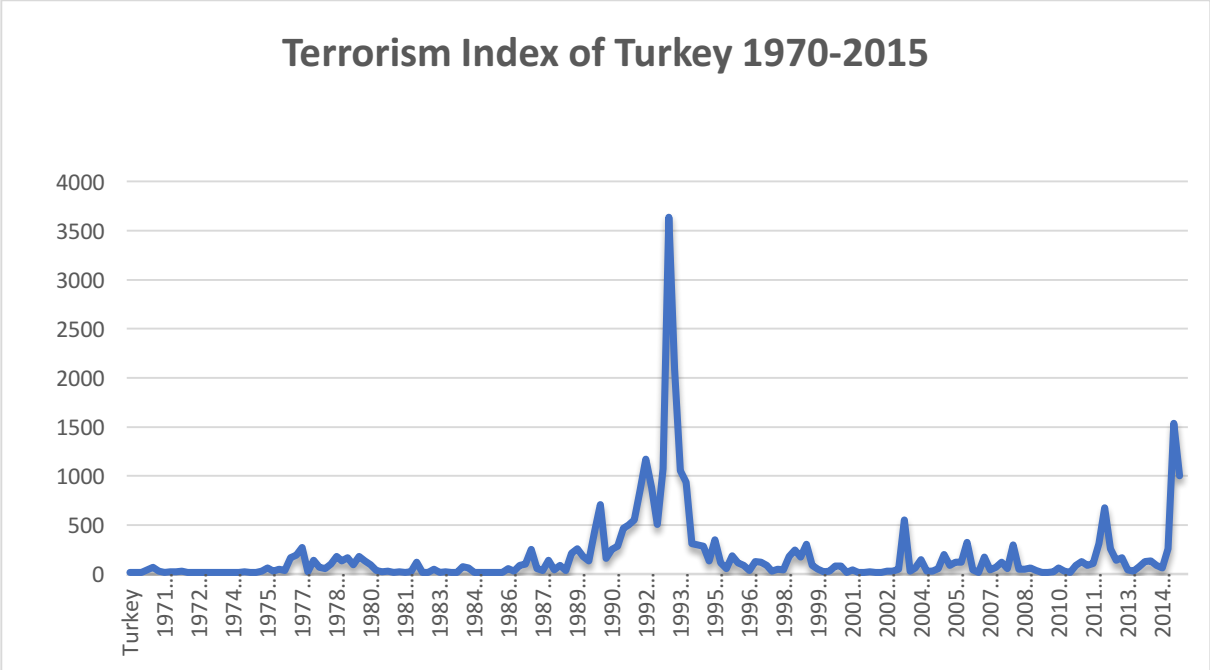
[b,c] Descriptive Statistics for Private and Public Investment for Sectorel level is also available, but not included here due to the space limitation.

[d] Data period is between 1981-2015 with panel setup. Id variable is City.

The index starts to rise in mid-1970s and peaks before 1980. Terror incidents were mostly committed by leftist and rightist terrorist groups in the 1970s. The Turkish Military staged a coup in 1980 due to increased terrorist incidents in the country. Terror index next peaks in 1992-1993. Except for some periods of peace and cease-fire initiated by PKK, Turkey has experienced a sustained campaign of Terrorism since the 1970s.

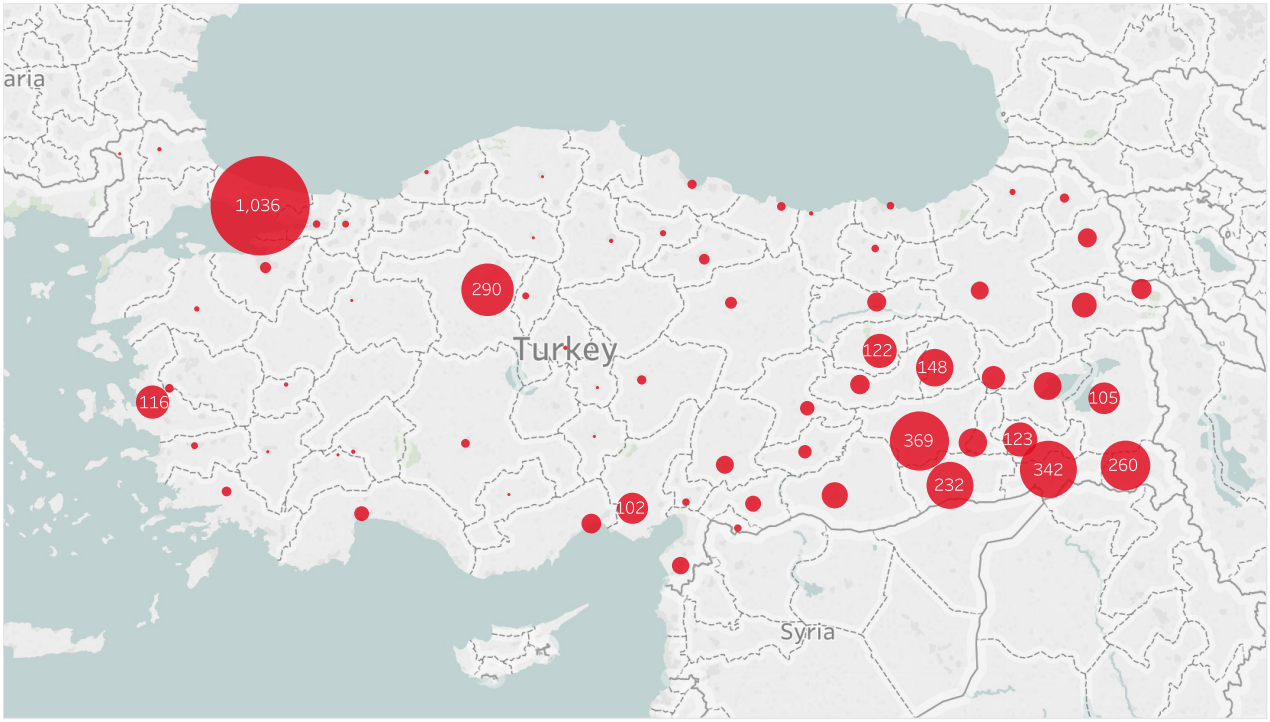
The volatility of the terrorist activity correlates with the seasonality of the data and harsh winter conditions of southeastern part of Turkey, which become a natural barrier for terrorist activities. Terrorist activities had a trend of decline after the capture of the leader of the PKK, but starting 2001, there was a resurgence of the terrorist activities. In 2009, the ruling party, AKP, took the initiative to start the National Unity and Brotherhood Project aims to a cease-fire, demilitarization of PKK and open democratic channels to all groups. Although it started with high hopes, this process gradually broke down; starting with the second quarter of 2011, the terrorism sequence started again with no hope of ending. The current trend of terrorism is volatile depending the political atmosphere of the country, but no sign of ending.

Figure 1: Terrorism Index in Turkey, 1970-2015



To better understand the distribution of terrorism events and lethality, I calculated the distribution of incidents and fatalities according to their region. Figure 2 shows that more terrorism and terrorism-related fatalities occur in southern Turkey than in any other region. It is evident in all graphs that terrorism has primarily has affected the eastern Turkey, particularly the South-East. On the other hand, Istanbul and Ankara, which have the highest population in Turkey, respectively, according to 2010 census results of TURKSTAT, have the highest number of terror index, terror incidents, fatalities and wounded, due to the large population density of urban areas are subject to a greater vulnerability to terrorism (Llussá and Tavares, 2007).

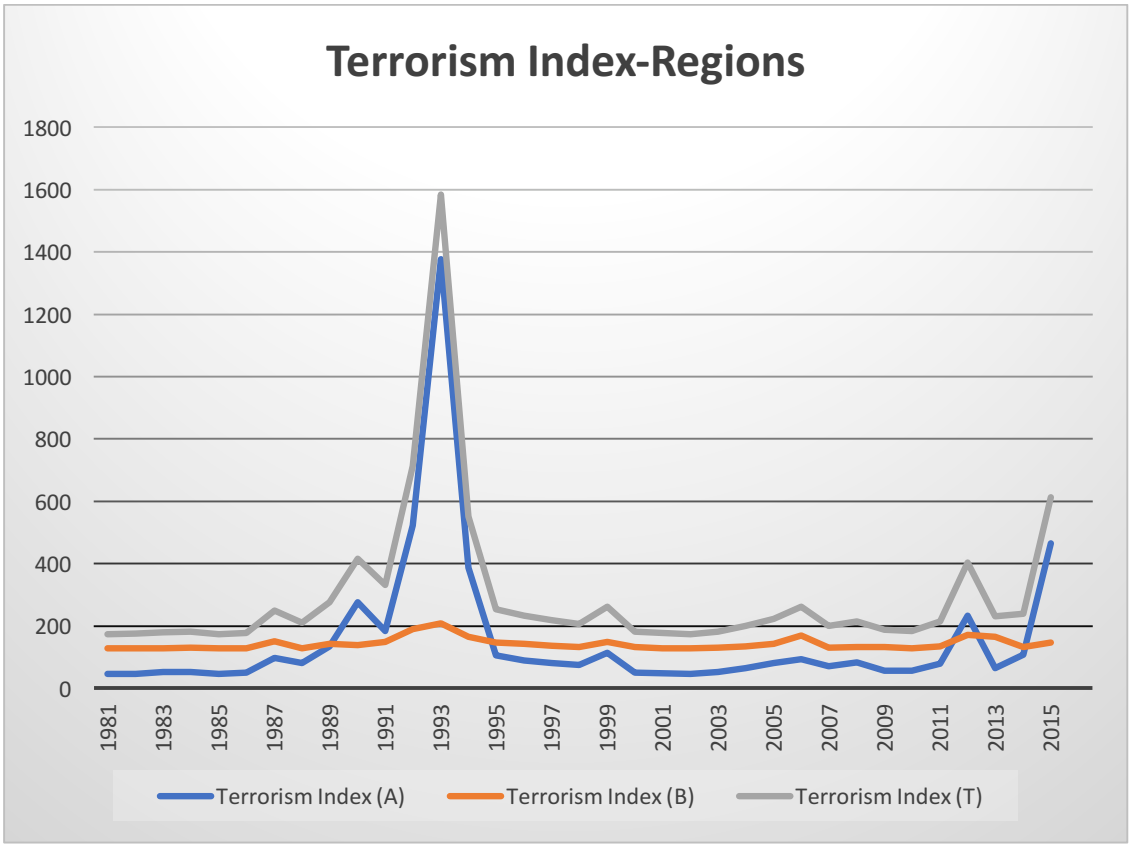
Figure 2: Number of Terrorist Events between 1970-2015



This graph confirms literature that terrorist acts mostly occur in major cities to get public and media attention. Also, terrorism happens where there are inward and outward sanctuaries where terrorists can easily hide. The southeastern region of Turkey is bordered by Syrian, Iraq and Iran, and these countries frequently support the PKK fighters, providing them bases and safe houses. For example, the main military base of PKK located at Qandil Mountains in Northern Iraq.

The next section analyzes the main variable of interest, the terrorism index. To see a clearer pattern of how terrorist activities affected the regions, two subsamples are designed. The first region is designated as Kurdish-populated areas following Sonmez (2012) and Mutlu (1995). It includes 21 cities, mostly located southeastern and eastern part of Turkey. The second regions include all other provinces excepts Istanbul, Ankara, and Izmir, which have been removed from both samples because they show up as an outliner.

Figure 3: Terrorism Index by Different Regions; A: Kurdish; B: Non-Kurdish; T: Total



It is apparent from the above graph that eastern Turkey, a highly Kurdish populated area where conflict mostly occur, attracts more terrorism than the rest of the country.

Figure 4: Public Investment Compared Regions

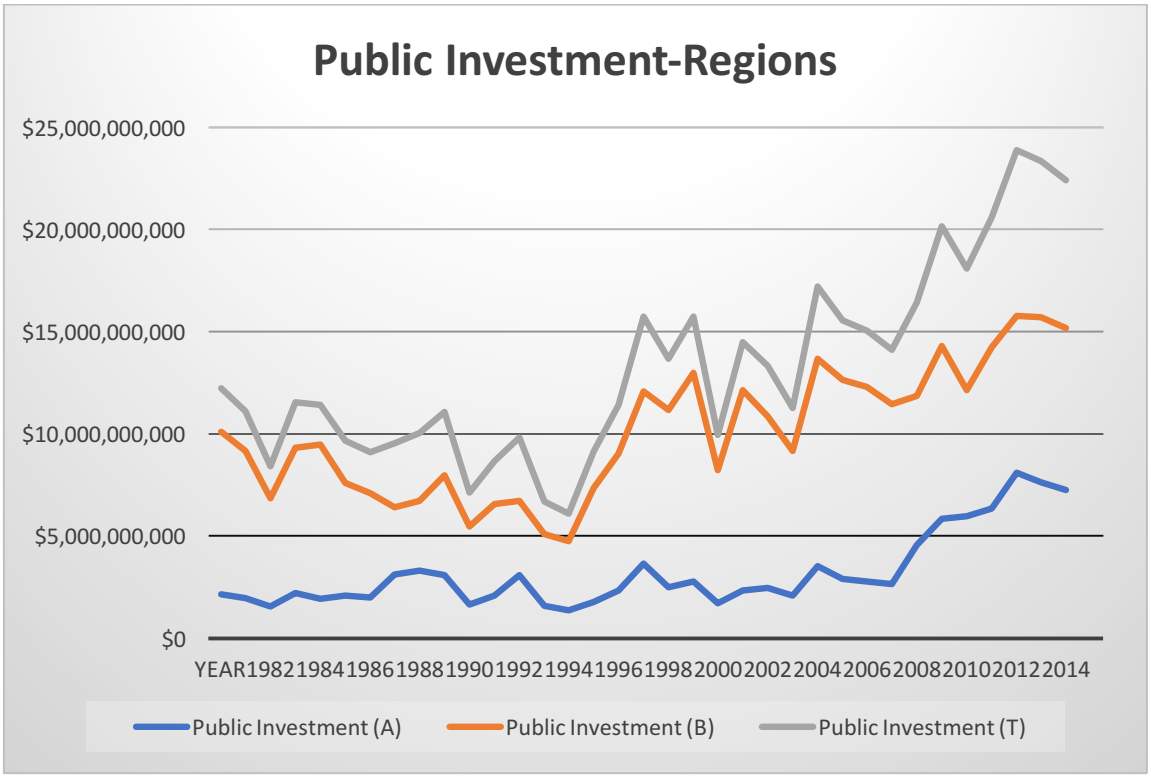
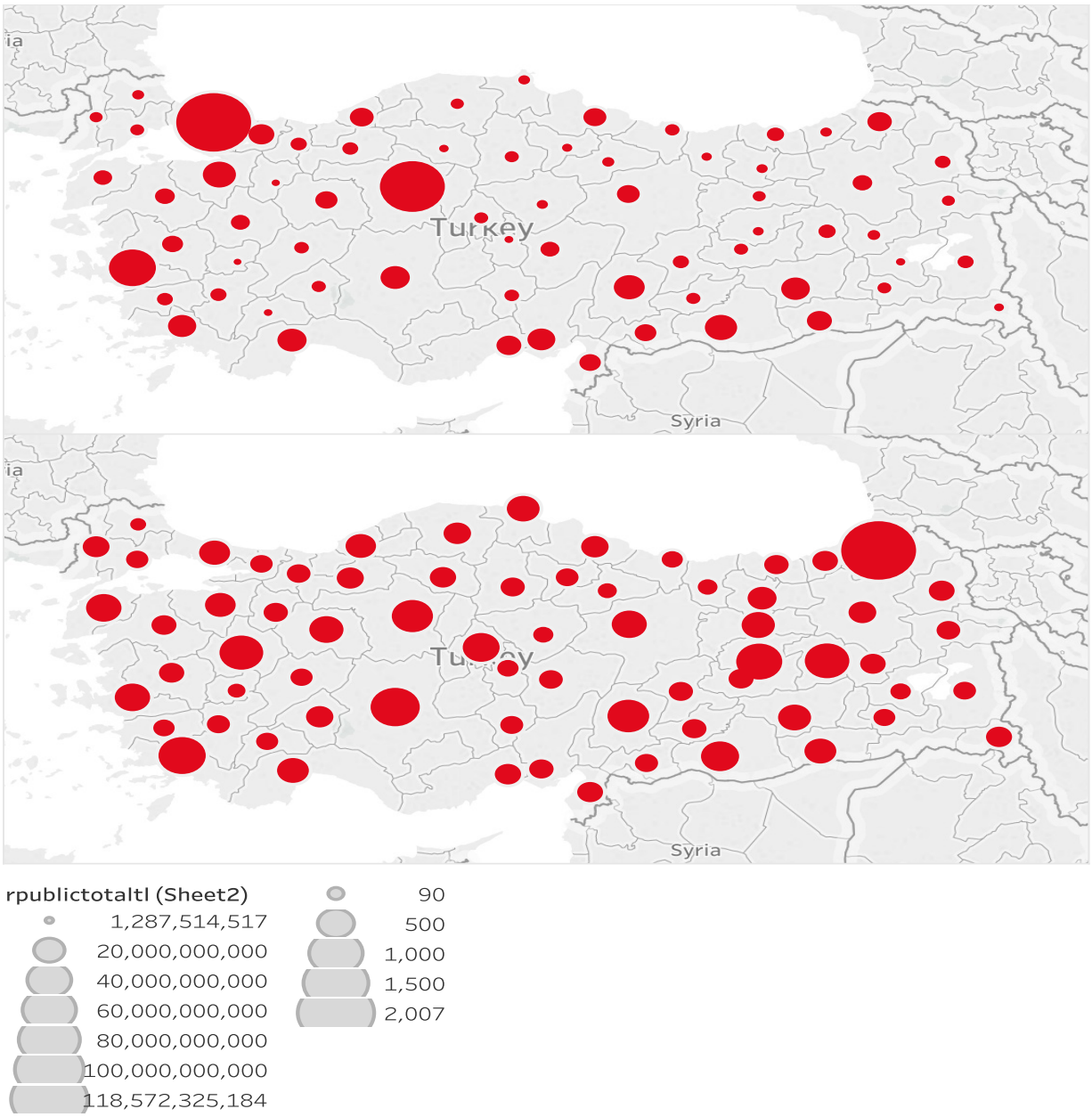


Figure 4 shows that there is steady growth in public investment in all regions, but the subnational distribution of public investment follows an uneven pattern that mirrors social, economic, and political disparities outlined in this study. Figure 5 illustrates an uneven regional distribution. Apparently, the big cities as well as the western and coastal regions have attracted a dominant share of public investments. Istanbul, Ankara, and Izmir take the lion's share of the public funds. Three big cities receive 35% of all public investment. Another trend is that public investment centers around hub cities (Konya; Malatya), Coastal Areas (Antalya, Adana) and natural resource areas (Mardin-Siirt, Sinop). Kurdish populated areas are normally below average except Urfa, Diyarbakir, Mardin, Hakkari; but, these cities mostly receive Energy/Security related investment, where the benefit for the local economy can be disputed.

Figure 5: Sum of Total Real Public Investment between 1981-2015 and Average Per Capita Real Public Investment



Next comes the geospatial distribution of private investment incentives and sectoral distribution of it. As Figure 6 shows, there is volatile growth in private investment in western part of Turkey. The eastern part of the country has very low private investment. Private investment concentrates on coastal and western part of the Country. Istanbul, Izmir, Adana and Kocaeli take the most of the private funds. Tunceli, Hakkari, and Bitlis have the lowest private investment.

Figure 6: Private Investment Compared Regions

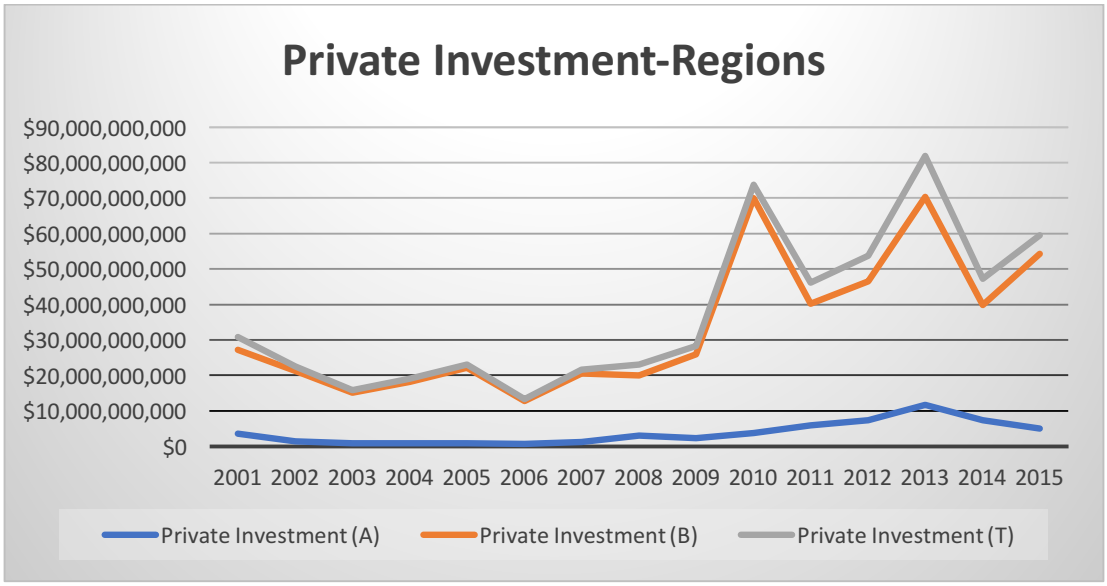
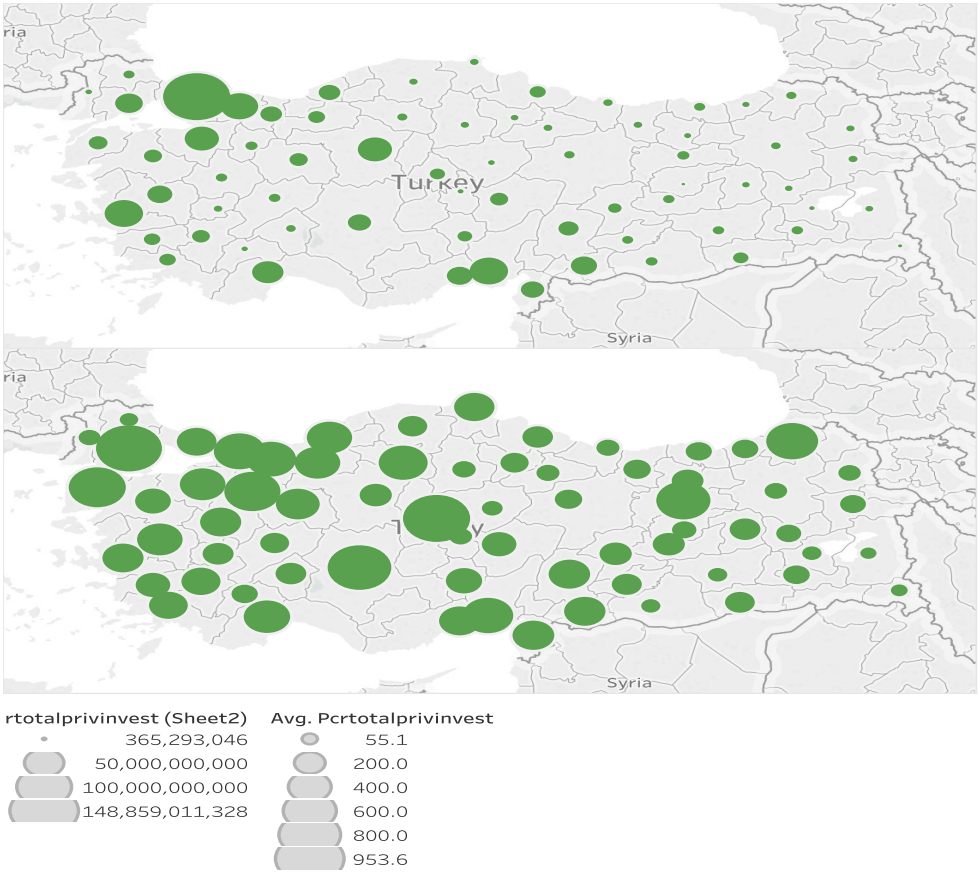


Figure 7: Sum of Total Real Private Investment between 2001-2015 and Average Per Capita Real Private Investment



5 Empirical Models and Estimation

Current evidence from cross-country or case study econometric studies is often a questionable treatment of endogeneity. This paper makes a key contribution to resolve this issue: it exploits dynamic panel data techniques, namely the System-GMM estimator, to account for reverse causality and unobserved heterogeneity biases (Tranchant, 2016). The paper provides a conceptual framework to generate predictions on how protracted terrorism influences the investment level of public and private agents. This research then uses System GMM estimations to test these predictions. The system GMM estimator is the most credible model to deal with unobserved heterogeneity, reverse causality, and conflict dynamics and to provide consistent estimates of the effect of terrorism on Investment. The study presents estimates of the two investment equations; one for Private Investment and one for Public Investment with five different econometric methods including: Pooled OLS, Fixed Effect, Random Effect, Panel Instrumental Variable Method, and lastly, Dynamic Arellano-Bond Panel estimation. This section also includes several tests for the statistical robustness of the equations presented.

Pooled panel data collected on 61 cities in Turkey during the years 1981 to 2015 to test the two terrorism hypotheses regarding terrorism's effects in investment, then two synthetic regions were created to distinguish between Kurdish-populated cities and Non-Kurdish cities. Different specifications for the hypotheses are estimated, i.e., the exclusion three major cities, Istanbul, Ankara, Izmir due to suspected of the outlier effect. The study period is limited to the years from 1981 to 2015 for public investment, as 1981 is the first year in which data for public investment was collected and 2015 is the last year that data for terrorism are available. For private investment, data is between 2001-2015. The panel data analysis allows this research to take advantage of variations in the terrorism data over time and across cities. Using the city-year as the unit of analysis, this study builds the econometric model explained above.

Since the primary theoretical proposition of this study examines whether the presence of prolonged terrorism within cities is a significant determinant of investment, this study conducts 'within' estimations consisting of OLS regression with city fixed-effects. This technique allows to distinguish between the effects of policy changes and other less variable elements of the investment climate on investment. Analyses using city-specific fixed-effects models can control

for unobserved influences that remain constant over time. That is, city fixed-effects reflect the unique political and economic environments of each city in attracting potential investors. Furthermore, preliminary Hausman tests suggest that this method is preferable over random-effects models. This empirical technique has been used in many recent analyses studying the determinants of FDI (e.g. Cheng & Kwan, 2000; Jensen, 2003; Büthe & Milner, 2008; Haftel, 2010, Powers & Choi, 2012). To correct for heteroscedasticity that is often present in pooled panel data, I also employ Huber-White robust standard errors clustered over cities.

Following this tradition, this research uses panel data which is the unit of analysis is cities, a row in data can be called city-year(cyr). It is strongly balanced and in the long-format. Including lags of the dependent variable in the estimation is also challenging as, by construction, such variables are correlated with the error term. This study exploits the system GMM estimator, which yields consistent estimates even in the presence of all three threats.

5.2 Tests for Stationarity and Cointegration

First, tests for the order of integration of each of the variables appearing in equation (2) is reported. Since it turns out that for some variables the hypothesis of difference-stationarity cannot be rejected, equation (2) needs to be re-parameterized with these variables in first differences. Therefore, it includes tests for cointegration of the conceivably difference-stationary variables.

Even though the study uses the panel dataset framework, it would be useful also to test each time-series for the unit root, then combine the results and judge whether the data has a unit root or not, because the time-series characteristics carry through to the panel dataset. Furthermore, alongside testing for unit root, one should also free the series from serial correlation by adding as many lags as necessary until serial correlation rejected. Two different tests provided to check stationarity of the data. One of these test is a Fisher-type unit-root test, and another one is an Im-Pesaran-Shin test, which both work well with an unbalanced panel. Panel unit root testing emerged from time-series unit root testing. The main difference to time series testing of unit roots is that we should consider asymptotic behavior of the time-series dimension T and the cross-sectional dimension N. The way in which N and T converge to infinity is critical if one wants

to determine the asymptotic behavior of estimators and tests used for nonstationary panels. Here tests for a unit root to determine if the panel set is stationary. The null hypothesis of this test is that all panels contain a unit root. The results shown tables below fail to reject this hypothesis for GDP, GPD per capita, inflation and interest rate variables which typically are expected to have a unit root. This means there are unit roots in the panels under the given test even after inclusion of the panel mean and time trend. It is, therefore, appropriate to estimate the model by first looking for a cointegrating relationship between (i)private investment, inflation, interest rate and GDP and (ii) public investment, inflation, interest rate and GDP.

The two-time series is stationary if they have constant mean and variance. If non-stationary at the level, one should check for cointegration. Cointegration examines as if two series have constant covariance over time. If so, the long-run relation can be modeled through Pooled OLS. In the case of panel, the concept is roughly same as in time series; however, some averaging or combined statistics are considered. Several tests have been proposed for panel cointegration like Pedroni (1999,2004), Kao (1999) and a Fisher-type test using an underlying Johansen methodology (Maddala and Wu, 1999). Pedroni (1999,2004) introduces flexibility/heterogeneity regarding cointegrating vector and dynamics under residual tests in the Engle-Granger tradition. It gives two groups of statistics: 'group-mean' (heterog), 'panel' (pooled), separate tests for parametric/ nonparametric versions, and includes adjustment terms to make all tests N (0,1) under null of no Cointegration (Eberhardt, 2011). Table 4 present the results of the cointegration tests including Pedroni test statistics, along with the corresponding statistics for each cointegrating vector (one vector for Private Investment and one for Public Investment). The Pedroni tests suggest the existence of a single cointegrating vector in ln(Privinvest), ln(Y), ln(P) and ln(r) with the p-value 0.000. There exists a similar outcome with public investment specification. Besides, the regression model will add the first difference of the variable for cointegrated variables.

Thus, considering above result, the final model after reparametrization and following similar methodology of the macroeconometric Investment model looks like the following.

$$\ln\left(Investment^{k}\right)_{t,i}$$
$$= b_{0,i}^{k} + b_{1}^{k}\ln(Investment^{k})_{t-1,i} + b_{2}^{k}\Delta\ln\left(Investment^{M}\right)_{t,i}$$
$$+ b_{3}^{k}TerrorismIndex_{t,i} + b_{4}^{k}TerrorismIndex_{t-1,i} + b_{5}^{k}\ln\left(P^{M}\right)_{t,i}$$
$$+ b_{6}^{k}\ln\Delta\left(P^{M}\right)_{t,i} + b_{7}^{k}\ln\left(W\right)_{t,i} + b_{8}^{k}\ln\left(Market\ Size\right)_{t,i}$$
$$+ b_{9}^{k}\ln(Economic\ Growth)_{t,i} + b_{10}^{k}\ln\left(Population\right)_{t,i}$$
$$+ b_{11}^{k}(Economic\ Openness)_{t,i} + b_{12}^{k}(Geography)_{i}$$
$$+ b_{13}^{k}(Human\ Capital)_{t,i} + b_{14}^{k}(Socioeconomy)_{t,i} + v_{i}^{k} + \mu_{t,i}^{k}$$

Equation 3

Table 3: Stationary Test Statistics

STATIONARITY TEST STATISTICS[a]					
Variable[b]	Description of Variable	Max.Lag[c]	Trend	Fisher-type unit-root test-based ADF[d]	Im-Pesaran-Shin unit-root test
lntpublicinvest	Log of Total Public Investment	1	X	0.0083***	0.0111***
lntprivinvest	Log of Total Private Investment	1	X	0.0000***	0.0000***
lntinvest	Log of Total Aggregate Investment	1	X	0.0001***	0.0094***
lnterrorismindex	Log of Terrorism Index	1	-	0.0000***	-
lnCasulties	Log of Casulties	1	-	0.0000***	-
lngdp	Log of GDP-TUIK	1	X	0.9999	0.8611
lngdppc	Log of GDP Per Capita	1	X	0.5549	0.0269
lngdpchange	Log of GDP Growth Rate	1	-	0.0008***	0.0171
lfpr	Labor Force Participation Rate	1	-	0.0000***	0.0000***
unemployment	Unemployment Rate	1	-	0.0000***	0.0000***
lnrealwage	Log of Real Wage	1	X	0.0000***	0.0000***
lninflation	Log of Inflation	1	-	1.0000	0.9991
lninterestrate	Log of Interest Rates	1	-	1.0000	1.0000
lnexport	Log of Export	1	X	0.2685	0.9996
lnimport	Log of Import	1	X	0.0002***	0.2821
lnexportpc	Log of Export Per Capita	1	X	0.1295	-
lnimportpc	Log of Import Per Capita	1	X	0.0000***	-
lnpopmerged	Log of Merged TUIK & Karaca	1	X	0.9948	0.9585
literacy	Literacy Rate	1	X	0.0000***	0.0000***
university	University Degree Rate	1	X	0.0000***	0.0001***
rural	Rural Population Rate	1	X	0.0000***	0.0000***
urban	Urban Population Rate	1	X	0.0000***	0.0000***
urbanlpopchange	Urban Population Change	1	-	0.1997	0.0038***
newbusiness	# newbusiness	1	X	0.0000***	0.0000***
closedbusiness	# closedbusiness	1	X	0.0000***	0.0000***
trucks	# of trucks sold	1	X	0.9999	0.9803
opennes	(export+import)/gdp	1	-	0.0000***	0.0000***

[a] Table adobted from Fielding (2006).

[b] All theoritical variable considered for stationarity test.

[c] Stata Command -xtunitroot- performs a variety of tests for unit roots (or stationarity) in panel datasets.
Avaliable tests are : i- The Levin– Lin–Chu (2002),ii-Harris–Tzavalis (1999),iii-Breitung (2000; Breitung and Das 2005),
iv-Im–Pesaran–Shin (2003), and v- Fisher-type (Choi 2001).These tests have as the null hypothesis that all the panels contain a unit root.
vi-The Hadri (2000) Lagrange multiplier (LM) test has as the null hypothesis that all the panels are (trend) stationary.
I choose Fisher-type and Im-Paseran-Shin Unit root tests since others require very strong balanced panel data.

[d] Values significant at the 5% level are shown ***

[e,f] The other columns indicate the lag length and presence of deterministic compenents in the Unit-root test
Sample is 1980-2015 with one year lag
Adding trend determined by visual overview of each variable as suggested in the literature. See Appendix for detail.

Table 4: Cointegration Test

Pedroni's Cointegration[a] Tests		
Variables	**ln(PublicInv), lN(Y), ln(y), ln(R), ln(P)**	
No. of Panel units: 68	Regressor: 4	No. of obs.: 1436
Test Stats.	***Panel***	***Group***
v	-2.439	.
rho	2.923	5.459
t	-3.565	-4.268
adf	6.315	11.36
P-Value	**0.000*** **	**0.000*** **
Variables	**ln(PrivateInv), lN(Y), ln(y), ln(R), ln(P)**	
No. of Panel units: 68	Regressor: 4	No. of obs.: 1013
Test Stats.	***Panel***	***Group***
v	-2.594	.
rho	1.003	4.18
t	-16.17	-20.63
adf	0.7853	4.015
P-Value	**0.000*** [b]**	**0.000*** **

All test statistics are distributed N(0,1), under a null of no cointegration, and diverge to negative infinity (save for panel v).
Data has been time-demeaned.

[a] xtpedroni tests for cointegration among one or more regressors by using seven test statistics under the null of no cointegration, and it also estimates the cointegrating equation for each individual as well as the group mean of the panel. For nonstationary heterogeneous panels that are long (large T) and wide (large N).The test can include common time dummies and unbalanced panels.

[b] P-value is not reported in official package, The author calculated from rho value.

5.3 Model Estimation Techniques

5.3.1 Pooled Ordinary Least Estimation (POLS)

In a dynamic panel model, the dynamic error components regression is characterized by the presence of a lagged dependent variable among the regressors, i.e.,

$$\boldsymbol{y_{it} = \gamma y_{i,t-1} + x_{it}\beta + \alpha_i + \varepsilon_{it}}$$

Equation 4

The current value of Y depends on its prior state, and future states of Y depend on current ones. Y is also a function of stable unit-level unobservables ($\boldsymbol{u_i}$) and an idiosyncratic error term. There can be serious issues with estimation of the Dynamic Panel Model due to the presence of the lagged dependent variable $\boldsymbol{y_{i,t-1}}$ which can induce an intrinsic correlation between the independent variables and the equation's composite error term ($\boldsymbol{\alpha_i + \varepsilon_{it}}$). This can give biased results. There are four reasons for y_{it} being serially correlated over time:

1. True state dependence: via $y_{i,t-1}$
2. Observed heterogeneity: via x_{it} which may be serially correlated
3. Unobserved heterogeneity: via α_i
4. Error correlation: via ε_{it}

$(y_{i,t-1})$ is a direct function of ε_{it} such that one of the independent variables $(y_{i,t-1})$ is intrinsically related to the error term of that equation. This introduces endogeneity bias in estimates of the effects of $(y_{i,t-1})$ and by extension, the other independent variables. Thus, introducing the lagged dependent variable complicates estimation enormously. Pooled OLS (POLS) and Random Effect (RE) estimation are inevitably biased; $(y_{i,t-1})$ is necessarily correlated with α_i, because α_i affects the outcome always. Fixed Effect (FE) estimation of Lagged Dependent Variable Models does also not work because strict exogeneity is necessarily violated ("Nickell bias") (Wooldridge, 2010). Thus, one should use instrumental variable (IV) methods, or Arellano/Bond GMM Estimation to use FD where $(y_{i,t-2})$ as IV if the "sequential exogeneity" assumption holds and lags are valid IVs (Brüderl 2015; Baum C.F., Schaffer M.E., Stillman, S. 2003, 2007; Baum 2013).

If this study were to estimate this model ignoring its dynamic panel nature, it could merely apply regress with panel-clustered standard errors with Pooled OLS. One obvious difficulty with this approach is the likely importance of city-level unobserved heterogeneity. This research has accounted for possible correlation between cities' errors over time with the cluster-robust VCE, but this does not address the potential impact of unobserved heterogeneity on the conditional mean. In other words, in the pooled model, there is no model for group/individual heterogeneity. Thus, pooled regression may result in heterogeneity bias. So OLS is biased upward and is inconsistent, hence GLS and ML estimators are also generally biased. They depend critically on assumptions about initial conditions y_{i0}, and how they are generated. There are other IV estimators which correct for the endogeneity of the lagged dependent variable and are also independent of initial conditions i.e. Anderson-Hsiao, 1992; Arellano-Bond,1991; Blundell-Bond; Pudney, Conti, 2006.

5.3.2 Fixed Effect Estimation (FE)

The most commonly employed model for panel data, the fixed effects estimator, addresses the issue that no matter how many individual-specific factors you may include in the regressor list, there may be unobserved heterogeneity in a pooled OLS model. This will commonly cause OLS estimates to biased and inconsistent (Baum, 2013). Panel data and within estimation allow to identify causal effects under weaker assumptions: time-constant unobserved heterogeneity

does not bias estimates. A fixed effects analysis achieves this purpose explicitly (Wooldridge, 2010).

A serious difficulty arises with the one-way fixed effects model in the context of a dynamic panel data (DPD) model particularly in the “small T, large N" context. As Nickell (1981) shows, this arises because the demeaning process which subtracts the individual’s mean value of y and each X from the respective variable creates a correlation between regressor and error. Although this study applies the within transformation to take account of this aspect of the data and run fixed effect, the fixed effects estimates will suffer from Nickell bias, which may be severe given the short time-series available.

The demeaning operation creates a regressor which cannot be distributed independently of the error term. Nickell demonstrates that the inconsistency of $\hat{\gamma}\, as\ N \to \infty$ is of order 1/T, which may be quite sizable in a “small T" context. If $\gamma > 0$, the bias is invariably negative, so that the persistence of y will be underestimated. Empirical studies show that at lease 1/3 of true value will be missing. The inclusion of additional regressors does not remove this bias. Indeed, if the regressors are correlated with the lagged dependent variable to some degree, their coefficients may be seriously biased as well (Baum, 2010).

Note also that this bias is not caused by an autocorrelated error process ε. The bias arises even if the error process is i.i.d. If the error process is autocorrelated, the problem is even more severe given the difficulty of deriving a consistent estimate of the AR parameters in that context.[5]

5.3.3 Random Effect Estimation (RE)

When the observed characteristics are constant for each individual, a FE is not a useful tool because such variables cannot be included. An alternative approach, known as a random effect (RE) model that, subject to two conditions, provides a solution to this problem. As an alternative

[5] This study tests for first-order correlation suggested by Powers & Choi (2012) which rejects the null hypothesis of no first-order correlation, indicating that serial correlation is present in our data. Although the lagged dependent variable can address this issue, one can further correct for this problem by using a statistical technique that is specifically designed to remedy autocorrelation, namely, generalized estimating equations (GEEs).
The model tests the effects of the terrorism variables and control variables by using GEE population-averaged models with semi-robust standard errors clustered over cities. Within that specification, terrorism continues to exert a statistically significant and negative effect on private investment ($p < 0.001$), and negative but not insignificant effect on Public Investment.

to considering the individual-specific intercept as a "fixed effect" of that unit, we might consider that the individual effect may be viewed as a random draw from a distribution:

$$\boldsymbol{y_{it}} = \boldsymbol{X^*_{it}\beta^*} + [\boldsymbol{u_i} + \boldsymbol{\varepsilon_{it}}]$$

Equation 5

where the bracketed expression is a composite error term, with the $\boldsymbol{u_i}$ being a single draw per unit. This model could be consistently estimated by OLS or by the between estimator, but that would be inefficient in not taking the nature of the composite disturbance process into account. A crucial assumption of this model is that $\boldsymbol{u_i}$ is independent of $\boldsymbol{X}^*$ means city i receives a random draw that gives its high investment ratio. That $\boldsymbol{u_i}$ must be independent of individual i's measurable characteristics included among the regressors $\boldsymbol{X}^*$. If the individual effects can be considered to be strictly independent of the regressors, then we can model the individual-specific constant terms as draws from an independent distribution. This greatly reduces the number of parameters to be estimated, and conditional on that independence allows for inference to be made to the population from which the survey was constructed (Baum, 2013).

In contrast to fixed effects, the random effects estimator can identify the parameters on time-invariant regressors such as altitude or forestry ratio at the city level. Like pooled OLS, the GLS random effects estimator is a matrix weighted average of the within and between estimators. In comparison to the fixed effects model, where terrorism regressors were insignificant and small, we see that the terrorism variable is significant and within the range in random effects model. The Hausman test[6] favors the fixed effect, but since the assumption of independence is violated, the inconsistent random effects estimates will differ from their fixed effects counterparts so instead this study focuses on Dynamic Panel data estimation which addresses the issues above.

Two arguments in favor of RE are often brought forward, RE allows for estimating effects of time-constant regressors and RE is more efficient than FE, if $E(x'_{it}\alpha_i) = 0$. Hence, the same problem occurs with the RE estimator. To apply RE, quasi-demeaning is performed, and $y^*_{i,t-1}$ will be correlated with $u^*_{i,t}$. The same problem affects the one-way the RE model. The u_i error component enters every value of y_{it} by assumption so that the lagged dependent variable cannot be independent of the composite error process. Under no omitted variables assumption, a

[6] Hausman Test; $\chi^2 = 208.06$ & Prob>chi2 = 0.0000

random effect model appears the best solution. It produces unbiased estimates of the coefficients, is efficient, uses all the data available, and produces the smallest standard errors. The RE Model can deal with observed characteristics that remain constant for each individual. On the other hand, if there are omitted variables, which are correlated with the X_{it} in the model, then the FE[7] provides a way for controlling for omitted variable bias. Many methods assume ε_{it} and α_i are i.i.d. The estimation yields wrong standard errors if heteroskedasticity or if errors are not equicorrelated over time for a given individual (Baum 2010;2014, Greene 2003). The Pooled FGLS estimator with AR (1) error & cluster-robust se's estimated and comparison of the results with other models proposed within this study.

5.3.4 IV-GMM Panel Estimation

This research aims to find that terrorism is one factor that reduces the investment, but it must also consider the reverse causality in this relationship, where the level of investment is likely to be partially determined by the historical terrorism data in each city. In this context, OLS estimates of the relationship will be biased even if additional controls are added to the specification. To overcome the problem associated with endogeneity, Panel IV GMM model introduced as an alternative model of estimation. There are two forms of endogeneity one should address: reverse causality-terrorism tend to occur with less investment friendly cities. Unobserved common factors- safer cities invest more in security thus attract more investment. Thus, when explanatory variables correlated with the regression error term, IV methods provide a way to obtain consistent parameter estimates. Although IV estimators address issues of endogeneity, the violation of the zero-conditional mean assumption caused by endogenous regressors can also arise from two other common causes: measurement error in regressors (errors-in-variables) and omitted-variable bias (Baum, 2009; Wooldridge,2010).

It is convenient to combine the IV technique with panel data techniques. However, one still needs an instrument(s) that's uncorrelated with the error term—or with the transformed error term, when panel data transformations are done. If sequential exogeneity is valid, then FD-IV can

[7] The seemingly unrelated regression estimator (SURE) model is alternative to fixed effect model and considerably more flexible than the fixed-effect model for panel data, as it allows for coefficients that may differ across units. I run Sureg, cofficient for private investment is -.3174366 within the range and statistically significant. (See Baum, 2013 for detailed discussion.)

use the lagged regressors as a valid instrument (Brüderl, 2015). For an overidentified equation, IV-GMM cluster-robust estimates will be more efficient than 2SLS estimates. Instrumental variables techniques are powerful, but if a strong rejection of the null hypothesis of the Sargan–Hansen J test is encountered, one should strongly doubt the validity of the estimates (Baum, 2013). Considering the limitations described above, this research run the benchmark with IV Method using the first and second difference of terrorism variable as an instrument. The model is estimated as 2-step GMM estimation, as there are one endogenous regressor and two excluded instruments. The Hausman test statistic has a p-value of 0.2929, suggesting that the data overwhelmingly reject the use of OLS in favor of Panel IV. At the same time, The J statistic fails to reject its null, which shows the quality of these estimates (the p-value of 0.5397) that indicates that the overidentifying restrictions are not rejected for all data.

Accepting that the weak instruments is a problem in IV-GMM set-up, even when the first-stage t- and F-tests are significant at conventional levels in the sample. In the worst case, the bias of the IV estimator is the same as that of OLS, IV becomes inconsistent and instrumenting aggravates the problem (Staiger and Stock, 1997). That is why this study proceeds with the Arellano-Bond "Generalized Method of Moments" Estimator which can address all issues outlined above.

5.3.5 Dynamic Panel Data with The Arellano-Bond "Generalized Method of Moments" Estimator

Existing research indicates that when firms choose to invest in a location, their decisions are generally long-lasting. In other words, once a city is chosen as an investment destination, its investment volume remains relatively stable. This may result from the fact that some cities are just generally better at attracting investors (Haftel, 2010) or that the choice to invest in local markets represents something of a sunk cost that can be difficult to reverse. This situation can pose a problem for empirical analyses since it violates the OLS assumption that the observations in year t are independent of the observations in year t–1. This may be particularly troublesome for the regression analysis since investment have been shown to demonstrate higher levels of autocorrelation than FDI flows (Aisbett, 2007). Although inclusion of the lagged dependent variable helped us to address this issue in the previous models, we further correct for this

problem by using a statistical technique that is specifically designed to remedy autocorrelation as well as the reverse causality issue, namely Dynamic Panel Data with The Arellano-Bond "Generalized Method of Moments" Estimator.

One treatment is the fixed effects (FE) transformation as shown in previous section, but there is still a correlation between the demeaned lagged Y and the demeaned error term. Theoretically, as T goes infinity, the average error goes to 0, so in that case, the error term would now be ε_{it} , and will therefore no longer be related to $y_{i,t-1}$, so long as there is no autocorrelation in the ε_i. Thus, in long panels, the bias in dynamic panel models goes away. The FE models with the lagged dependent variable are appropriate when T is large, but in short panels, there is a bias in the FE estimation of the effect of lagged y on the order of $1/T$, which can be quite substantial (Nickel bias)(Woodlridge,2010). Since there is not consensus on what is the optimal size for T to avoid such a bias, in addition to Panel IV with its shortcoming, this study estimates the model with Arellano-Bond Estimation which gives the plausible method for this issue. In fact, Anderson and Hsiao (1982) suggested first differencing the model to get rid of the α_i's and then using $\Delta y_{i,t-2} = (y_{i,t-2} - y_{i,t-3})$ or simply $y_{i,t-2}$ as an instrument for $\Delta y_{i,t-1} = (y_{i,t-1} - y_{i,t-2})$. These instruments will not be correlated with $\Delta\varepsilon_{i,t} = (\varepsilon_{i,t} - \varepsilon_{i,t-1})$, if the $(\varepsilon_{i,t})$'s themselves are not serially correlated. This instrumental variable (IV) estimation method leads to consistent but not necessarily efficient estimates of the parameters in the model because it does not make use of all the available moment conditions, and it does not consider the differenced structure on the residual disturbances, $\Delta\varepsilon_{i,t}$. The problem with this method is that the model loses three waves of data to implement this procedure. To partially get around this, another possibility would be to use the level variable $y_{i,t-2}$ instead of the twice-lagged difference term as an instrument. $y_{i,t-2}$ is uncorrelated with the error term $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$, i.e. lagged difference in $x_{i,t-1}$ and $x_{i,t-2}$ (Brüderl, 2015).

Arellano and Bover (1995) develop a unifying GMM framework for looking at efficient IV estimators for dynamic panel data models (Baltagi,2005). Arellano-Bover (1995)/Blundell-Bond (1998) System GMM expands on this by using lags of differences and levels as IVs and its Generalized Method of Moments (GMM) estimation. Arellano-Bond estimation starts by transforming all regressors, usually by differencing, and uses the Generalized Method of

Moments (Hansen 1982), and so is called Difference GMM. The Arellano-Bover/Blundell-Bond estimator augments Arellano-Bond by making an additional assumption, that first differences of instrument variables are uncorrelated with the fixed effects. This allows the introduction of more instruments, and can dramatically improve efficiency. It builds a system of two equations -the original equation as well as- the transformed one and is known as System GMM (Rodman, 2006; Baum 2013).

Arellano and Bond (1991) demonstrates that there are many more possible instruments for the lagged difference term in panel data sets. Their solution rests on the idea that deeper lags of y may be used as instruments for the lagged difference term, with more and more lags being available as one moves forward in time in the panel. So, as ones moves through the panel he can pick up more and more instruments to get a better precision of the estimates. Besides, he can use both lagged levels and lagged differences of the exogenous variables as other instruments. Thus, the Arellano-Bond estimator is generally said to be superior to Anderson-Hsiao, as it uses far more information and is thus more efficient (Holtz-Eakin, Newey and Rosen (1988); Arellano and Bond (1991). Based on these additional moments, Arellano and Bond (1991) suggest a GMM estimator and propose a Sargan-type test for over-identifying restrictions (Jacop &Osang 2015; Rodman 2006, Finkel, 2015).

The Arellano–Bond estimator sets up a generalized method of moments (GMM) problem in which the model is specified as a system of equations, one per time period, where the instruments applicable to each equation differ. For instance, in later time periods, additional lagged values of the instruments are available (Baum 2013). The instruments include suitable lags of the levels of the endogenous variables which enter the equation in differenced form as well as the strictly exogenous regressors and any others that may be specified.

The general model of the data-generating process is;

$$\boldsymbol{y_{it} = \gamma y_{i,t-1} + x_{it}\beta + \alpha_i + \varepsilon_{it}}$$

$$\boldsymbol{u_{it} = \alpha_i + \varepsilon_{it}}$$

$$\boldsymbol{E(\alpha_i) = E(\varepsilon_{it}) = E(\alpha_i \varepsilon_{it}) = 0}$$

Equation 6

Here the disturbance term has two orthogonal components: the fixed effects, $\boldsymbol{\alpha_i}$, and the idiosyncratic shocks, $\boldsymbol{\varepsilon_{it}}$. Note that we can rewrite Equation (6) as

$$\Delta \boldsymbol{y_{it}} = (\boldsymbol{\gamma} - \mathbf{1})\boldsymbol{y_{i,t-1}} + \boldsymbol{x_{it}}\boldsymbol{\beta} + \boldsymbol{\alpha_i} + \boldsymbol{\varepsilon_{it}}$$

Equation 7

So, the model can equally be thought of as being for the level or increase of y. Sometimes the lagged levels of the regressors are poor instruments for the first-differenced regressors. In this case, one should use the augmented version system GMM. The system GMM estimator uses the levels equation to obtain a system of two equations: one differenced and one in levels. By adding the second equation, additional instruments can be obtained. Thus, the variables in levels in the second equation are instrumented with their own first differences. This usually increases efficiency (Mileva, 2007).

Although A-B Model gives remedy for aforementioned issues with panel data, the one disadvantage of the first difference transformation is that it magnifies gaps in unbalanced panels. If some value of Δy_{it} is missing, then both Δy_{it} and $\Delta y_{i,t-1}$ will be missing in the transformed data. This motivates an alternative transformation: the forward orthogonal deviations (FOD) transformation, proposed by Arellano and Bover (1995). In contrast to the within transformation, which subtracts the average of all observations' values from the current value, and the FD transformation, that subtracts the previous value from the current value, the FOD transformation subtracts the average of all available future observations from the current value. While the FD transformation drops the first observation of each individual in the panel, the FOD transformation drops the last observation for each individual. It is computable for all periods except the last period, even in the presence of gaps in the panel. This study implements forward orthogonal deviations transformation, that means instead of subtracting the previous observation from the contemporaneous one, it subtracts the average of all future available observations of a variable. No matter how many gaps within the sample, it is computable for all observations except the last for each individual, so it minimizes data loss (Baum 2013; Rodman, 2006).

The above structural model can be specified as a reduced form dynamic panel data model[8]:

$$I_t^i = \beta_0 + \beta_1^i I_{t-1}^i + \beta_2^i X_t^i + \beta_3^i Z_t^i + v_i + \gamma_t + \mu_t^i$$

Equation 8

Where, I_t^i is investment level, $I_{t-1}^i$is the previous period's investment, X_t^i is the set of time varying economic and political variables, Z_t^i is the set of time-invariant exogenous variables such as geographical measures, v_i is the country specific fixed effect, γ_t is the time dummy, and μ_t^i is the idiosyncratic error term.

Estimation of equation (8) poses a few difficulties that need to be addressed. Endogeneity of the lagged dependent variable and the possible endogeneity of independent variables due to measurement error and/or reverse causality are typically addressed by using instrumental variable estimation methods. The standard approach is to estimate the above model in first differences, using previous lags of the explanatory variables as instruments. Specifically, the estimating model thus becomes:

$$I_t^i - I_{t-1}^i = \widetilde{\beta_1}(I_{t-1}^i - I_{t-2}^i) + \beta_2(X_t^i - X_{t-1}^i) + \tilde{\gamma}_t + (\mu_t^i - \mu_{t-1}^i)$$

Equation 9

Though first differencing eliminates the individual fixed effects, there is still endogeneity in the model since $E[(I_t^i - I_{t-1}^i)(\mu_t^i - \mu_{t-1}^i)]$ is not equal 0. The dynamic panel data estimator developed by (Holtz-Eakin, Newey, & Rosen (1988) and Arellano & Bond (1991) addresses this issue by using two or more periods lags of the explanatory variables as instruments for the differenced variables:

$$E[I_{t-s}^i(\mu_t^i - \mu_{t-1}^i)] = 0, \qquad for\ t = 3,4 \ldots T\ and\ s \geq 2$$

Equation 10

Blundell & Bond (1998) show that this difference estimator may not perform well when there is persistence in the lagged dependent variable and that the systems GMM, initially proposed by Arellano & Bover (1995) may be better suited. The systems GMM is based on the idea that additional moment conditions can be introduced by adding the level equation to the differenced

[8] Model specification is adopted from the study of Jacob & Osang 2015 "Democracy and Growth: A Dynamic Panel Data Study."

equation and using lagged differences of the explanatory variables as instruments for the level equation, that is:

$$E[(\,\mu_t^i(I_{t-1}^i - I_{t-2}^i)] = 0, \qquad for\ t = 3{,}4 \ldots T$$

Equation 11

System GMM is more suitable than Difference GMM since in most of the model specifications, the estimated value of $\widetilde{\beta_1}$ was close to unity. Another advantage of the systems estimator is that while the Arellano-Bond estimator purged all time-invariant measures from the estimating equation, Roodman (2009) shows that time-invariant exogenous variables (which are orthogonal to the individual fixed-effects) can easily be included in the systems-GMM model. Another advantage of the systems GMM approach is that the endogeneity of the explanatory variables in X can be addressed by using appropriate lags of these variables as instruments. For example, if,

$$E\left[x_t^i\ \mu_{ts}^i\right] \neq 0, \qquad for\ s \leq t$$

$$E\left[x_t^i\ \mu_{ts}^i\right] = 0, \qquad for\ s > t$$

two or more lags of X could be used since $E\left[x_{t-2}^i\ (\mu_t^i - \mu_{t-1}^i)\right] = 0.$

Thus, one does not need to use external instruments to control for potential endogeneity in the model if the system GMM estimation implemented. There are two other possible causes of endogeneity: measurement error and omitted variable bias. This study addresses the former by using alternative measures of terrorism including a casualty variable. Finally, as indicated in equation (3), this research controls for the other independent variables in all specifications and, in addition, for relevant economic and political proxy variables in the extended model to minimize the potential omitted variable bias.

Two tests routinely reported with the A-B GMM estimation to validate GMM estimates. The Hansen J-test is performed to test the validity of the exclusion restrictions. Under the null hypothesis, the instruments are correctly excluded from the model. Since this study uses Systems GMM, it reports a second test of the exclusion restrictions known as the difference-in-Hansen test. This test checks the validity of the additional exclusion restrictions that arise from the level equations of the Systems GMM model (see Roodman, 2009b). Since lagged values are used as instruments, an unbiased estimation requires the absence of second-order serial correlation in

the error term (see Arellano and Bond, 1991). To test this requirement, the Arellano-Bond AR (2) test performed. A p-value of greater than 0.05 implies the absence of second-order autocorrelation. In that case, the systems GMM can be applied without any adjustments to the instrument set. A p-value of less than 0.05 indicates the presence of an MA error term of order one or higher. In this case, the model needs to be re-estimated with the instrument set lagged by an additional period (Cameron & Trivedi, 2005).

Thus, the final model would estimate the relationship between public and private investment and terrorism with the standard choices of instruments in this case with two-step System GMM, Windmeijer-corrected standard errors, small-sample adjustments, and orthogonal deviations with two lags of instruments. The system GMM framework allows this research to model the dynamic aspects of the investment growth process and control for the endogenous nature of many explanatory variables.

5.4 Empirical results

5.4.1 Private Investment Incentives

Following the literature, first the Pooled OLS Model is presented as a benchmark model and the results in Model 1 indicate that terrorism has a causal effect on the private investment. The second and third model examine the impact of terrorism upon the private investment under the framework of fixed and random effect estimation, respectively. The fixed effect model is obtained controlling for city fixed-effects and time effects. Model 3 offers random-effects models as a counterpart to fixed-effects models although the Hausman Test favors the fixed effect model. The results in Models 1 to 3 provide support for our theoretical expectations discussed above. For instance, the terrorism variable in the models has a statistically significant and negative impact on private investment within a country ($p < 0.01$). When countries experience terrorist attacks that affect business, the amount of investment these cities can expect to receive decreases. The fourth model is instrumental variable estimation using lags of the terrorism index as an instrument. The finally model is the Arellano-Bond GMM Dynamic Panel Estimation (framework outlined above).

All five models except the fixed effect estimation (i.e., suffers from Nickel Bias) predict that terrorism has a negative effect on private investment. The benchmark POLS model states that 10% increase in terrorism within a country would reduce private investment by 2.7%; similarly, this effect is 3.2% in A-B GMM model.

The results of the estimation of the control variables in Models 1 to 5 are relatively straightforward. Of the variables that reach significance level (i.e., Market size, GDP growth rate, Economic Openness, Previous year's Private Investment level, Population Size, and Human Capital), all exert influence in the hypothesized direction. For instance, Market size is significant at the 0.01 level and is positive, indicating that cities with larger economies are better equipped to attract investment. Similarly, Economic Openness is significant at the traditional level, and it is positive, providing support for the view that cities that trade more are more attractive to receive investment.

Table 5 indicates that the current level of private investment depends positively on its level and rate of growth from the previous year. This suggests that a continuous pattern dominates the dynamics of private investment. Lagged private investment is positive, suggesting that the previous year's investment affects the current year's, and it is highly significant. That means, a 1% increase of last year's private investment will increase this year's private investment between 1.7%-3%. This prediction is relevant for risk-aversion of potential investors who seek to invest in areas in which they are already familiar. That is why the Marmara region in Turkey is always a hub for investors. Private investors avoid to investing in eastern part of Turkey partly because of ongoing conflict and partly because of the bias of investors who prefer to invest in familiar regions.

The amount of Investment that cities lose from terrorism is quite substantial. For instance, in the Model 5 in Table 5, the coefficient for terrorism is –0.3172 for A-B Model. Since the investment variable is log-transformed, this translates into a negative 3.2% change in investment for every additional 10% increase of terrorist attack. Because the amount of private investment in Turkey for 2015 in the dataset is approximately $38 billion, this negative 3.2% change results in an approximate loss of $1.26 billion for a 10 % increase terrorist incident. To better show the extent of how terrorism can affect a particular city, we consider the case of city of Diyarbakir.

Diyarbakır is one of the largest cities in the southeastern Turkey and the second largest city in Turkey's southeastern Anatolia Region, after Gaziantep. Diyarbakir is considered the unofficial capital of Turkish Kurdistan. As such, it has been a crucial point for conflict between Turkey's government and Kurdish insurgent groups. Diyarbakir, with 365 terrorist attacks, has been significantly affected by the sustained terrorist campaign. Diyarbakir also attracted about $112 million investment in 2015. Within the context of this city, every 10% increase of terrorist attack, therefore, decreases its investment by about $36 million. Over the time frame of the entire sample, this amounts to a total of approximately $537 million of investment being lost to terrorist attacks.

The R^2 for the model is high enough to make a prediction (R^2=73%). All other statistics are also in given frameworks; F-test/Wald test is highly significant (P-value is 0.00). The Hansen J test is failed to reject, Ho, which supports overidentification test is valid. The Arellano-Bond test for AR (1) in first differences (p -value, 0.00) is also rejected, but not Arellano-Bond test for AR (2) in first differences (p-value, 0.57). The number of instruments may be large relative to the number of observations (695,81 respectively).

The research hypothesis predicts that the size of a regression coefficient should be bigger for one group than for another (Kurdish vs Non-Kurdish cities). In other words, one might want to know whether a particular set of predictors leads to a multiple regression model that works equally effectively for two (or more) different groups (populations, treatments, cultures, locations.). This study assumes that the regression coefficient of terrorism predicting investment would be higher for Kurdish populated areas than the rest of the country. This research investigates investment data separately using two separate regressions for each group. Two separate regressions executed, one with the data for Kurdish cities only and one with the data for Non-Kurdish only, by splitting the data into two parts. The parameter estimates (coefficients) for two groups are shown below in Table 6 and 7, correspondingly. The results do seem to suggest that terrorism is a stronger predictor of private investment for Kurdish-populated cities (range-0.33-0.45) than Non-Kurdish (-0.14-0.22).

The overall picture from Tables 5 to 7 is that the economic variables dominating the evolution of investment in the cities are aggregate output, growth rate, the purchase price of capital goods

and openness, which shows the trade potential of the city and the real wage rate. This study does not have an access to the interest rate for city level so It is not included in the regressions. This result is in line with other work on investment models. The results here suggest that, to the extent that investors' decisions are based on both economic factors and political instability, they are mostly influenced by aggregate demand and protracted terrorism (Fielding 2003; Powers&Choi 2012).

It is noteworthy that there is a stable, systematic relationship between Turkey's private investment and aggregate demand despite the existence of political instability. The level of instability in Turkey is not so great as to undermine these basic economic relationships. Changes in economic conditions have predictable effects on private investment, even during periods of relatively high instability. Nevertheless, as it shown above, the level of terrorism does have a substantial impact on private investment.

5.4.2 Public Investment

This section considers the evidence on the economic and political determinants of investment in public investment, and on the dynamic interaction of the public investment and terrorism variable. Table 6 reports the results of five regression models mentioned in the empirical section. All five models predict that terrorism has a negative effect on public investment, but only IV model gives statistically significant coefficient. Taking IV Estimation as a benchmark model, it states that a 10% increase of terrorism within the country would reduce public investment by 0.75 % similarly; in A-B GMM model, this effect is 0.35%. Of the variables that reach significance (i.e., Real Wage, Previous year's Public Investment level, Deflator, Population), all exert influence in the hypothesized direction. For instance, the Population variable is significant at the 0.01 level and is positive, indicating that government invests more on cities with larger populations. Similarly, market size is significant at the traditional level, and it is positive, providing support for the view that cities that have big economies attract public investment.

Table 5: The Effect of Terrorism on Private Investment 2001-2015: All Cities

The effect of Terrorism on Private Investment 2001-2015: All Cities

	ESTIMATES OF MACROECONOMETRIC INVESTMENT MODEL				
Dep.Variable: Log of Private Investment[a,b]	POLS	Fixed Effects	Random Effects	IV-REG	AB-GMM[c]
Terrorism Index[b]	-0.2757***	-0.0456	-0.2614***	-0.2979**	-0.3172**
	(0.0968)	(0.0860)	(0.0842)	(0.1287)	(0.1381)
Lagged Private Investment	0.2253***	0.0211	0.2307***	0.3048***	0.1777***
	(0.0448)	(0.0641)	(0.0572)	(0.0541)	(0.0690)
D.Total Public Investment	0.1598	0.1467	0.1739*		
	(0.1078)	(0.0930)	(0.0923)		
Market Size (GDP)	0.7338***	0.6080	0.7248***		0.7888***
	(0.1137)	(0.4686)	(0.1316)		(0.2073)
GDP Growth Rate	0.1541**	0.1234**	0.1121**	0.1448***	0.1186
	(0.0622)	(0.0614)	(0.0462)	(0.0533)	(0.0765)
Population	0.1501	-2.0197***	0.1533	0.7515***	0.0888
	(0.1445)	(0.4078)	(0.1521)	(0.0984)	(0.2142)
Real Wage	-0.3731	-0.0211	-0.2496	0.6918***	-0.4849
	(0.2442)	(0.5358)	(0.1945)	(0.1715)	(0.3426)
Deflator for Investment	2.2425***	-0.9986	1.8124***		2.3691***
	(0.8096)	(1.5121)	(0.6713)		(0.8942)
Openness	0.7953***	1.0671**	0.7925***	1.0782***	0.8300***
	(0.2097)	(0.4836)	(0.2195)	(0.2334)	(0.2322)
Altitude of Province	-0.0001		-0.0001	0.0000	-0.0001
	(0.0001)		(0.0001)	(0.0001)	(0.0001)
University	0.0175	0.2292***	0.0306	0.1167***	0.0369
	(0.0345)	(0.0771)	(0.0348)	(0.0308)	(0.0480)
Literacy Rate	0.0722***	0.0776**	0.0694***	0.0781***	0.0604**
	(0.0222)	(0.0304)	(0.0202)	(0.0227)	(0.0257)
Forestry	0.5338*		0.5237	0.6179*	0.9482*
	(0.3152)		(0.3645)	(0.3180)	(0.4848)
Socioeconomic Index	-0.1121	-0.0617	-0.1281*	-0.1899**	-0.0621
	(0.0749)	(0.3641)	(0.0706)	(0.0748)	(0.0903)
Borderiis	-0.0998		-0.1040	-0.1375	-0.1981
	(0.1506)		(0.1459)	(0.1489)	(0.1882)
Ratio of Kurdish Population	0.0060*		0.0061*	0.0072**	0.0057
	(0.0036)		(0.0032)	(0.0031)	(0.0042)
Emergency Law	0.0393	0.0202	0.0884	0.1604	0.1666
	(0.2415)	(0.3005)	(0.2141)	(0.2513)	(0.3210)
Constant	-9.1299***	23.9610**	-9.6510***	-9.4267***	-7.2000**
	(2.7796)	(9.5047)	(2.2629)	(2.6001)	(3.2767)
Observations	695	695	695	695	695
F-test statistic	97.76	47.84		120.7	
Prob >F	0	0		0	
Number of city		67	67	67	67
City FE		YES		YES	YES
Year FE		YES		YES	YES
R-squared				0.7101	
Overall	0.7294	0.0283	0.729		
Between		0.0301	0.950		
Within		0.491	0.445		
Number of Instruments				1	81
Hansen test of overid. Restrictions[d]				0.376	54.81
Hansen Prob>chi2				0.540	0.665
Wald chi2			2562		2264
Prob>chi2			0		0
Arellano-Bond test[e]					2.57e-05
Arellano-Bond test2					0.757
Endogeneity Test[f]				1.113	
Chi-sq(1) P-val				0.291	

Robust standard errors in parentheses

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

[a] Logged Independent variables is used when necessary.

[b] Some coefficients are not shown due to space restrictions.Please refer to stata log file.

[c] The Arellano–Bond estimator is a generalized method of moments estimator used to estimate dynamic panel data models.

[d] The Sargan-Hansen test is a test of overidentifying restrictions.
The joint null hypothesis is that the instruments are valid instruments,
i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

[e] Arellano-Bond test; p-value of Arellano and Bond test for autocorrelation of order 2 and 3, respectively.

[f] Endogeneity Test; Under the null hypothesis that the specified endogenous regressors can actually be treated as exogenous, the test statistic is distributed as chi-squared with degrees of freedom equal to the number of regressors tested.

Table 6: The Effect of Terrorism on Private Investment 2001-2015: Kurdish

The effect of Terrorism on Private Investment 2001-2015: Kurdish

	ESTIMATES OF MACROECONOMETRIC INVESTMENT MODEL				
Dep.Variable: Log of Private Investment[a]	POLS	Fixed Effects	Random Effects	IV-REG	AB-GMM
Terrorism Index[b]	-0.4004*	-0.3498	-0.3335*	-0.5215*	-0.4515**
	(0.2169)	(0.2147)	(0.1821)	(0.2854)	(0.2025)
Lagged Private Investment	0.0823	0.0314	0.1082	0.2239**	0.1549
	(0.0861)	(0.1252)	(0.1130)	(0.0873)	(0.1118)
D.Total Public Investment	0.6073***	0.6366***	0.5675***		
	(0.2326)	(0.1877)	(0.1583)		
Market Size (GDP)	1.4790***	1.5055	1.5215***		1.3407*
	(0.5465)	(1.4937)	(0.5206)		(0.6787)
GDP Growth Rate	0.3823	0.5376*	0.2231*	0.3655	0.3308
	(0.2447)	(0.2835)	(0.1332)	(0.2259)	(0.2247)
Population	-0.3416	-0.2487	-0.3642	1.0214***	-0.2678
	(0.5070)	(0.6422)	(0.4259)	(0.1194)	(0.4968)
Real Wage	-1.8266**	-1.7383	-1.4144**	1.2245**	-1.4464
	(0.8312)	(1.4379)	(0.5499)	(0.4861)	(0.9380)
Deflator for Investment	8.0184**	7.2899	5.7040**		4.8073
	(3.4769)	(5.2961)	(2.6916)		(5.4529)
Openness	1.5532	-1.5056	1.6260	3.5070**	0.3625
	(1.7264)	(1.9079)	(1.0349)	(1.3701)	(1.6384)
Altitude of Province	-0.0001		-0.0002	-0.0005**	-0.0002
	(0.0003)		(0.0002)	(0.0003)	(0.0002)
University	0.0744	0.1400	0.1329	0.3446***	0.2125
	(0.1602)	(0.2145)	(0.1203)	(0.1130)	(0.2465)
Literacy Rate	-0.0394	-0.0439	-0.0395	-0.0045	-0.0147
	(0.0448)	(0.0587)	(0.0397)	(0.0413)	(0.0395)
Forestry	2.5893*		2.4369***	1.9620	2.4361**
	(1.4658)		(0.9022)	(1.1978)	(1.0165)
Socioeconomic Index	0.4437	0.9349	0.6370	0.6830**	0.8067
	(0.6776)	(1.0609)	(0.5768)	(0.2952)	(0.9166)
Borderiis	-0.1551		-0.1320		-0.2700
	(0.2957)		(0.1575)		(0.2173)
Ratio of Kurdish Population	-0.0180**		-0.0177***	-0.0061	-0.0082
	(0.0085)		(0.0060)	(0.0077)	(0.0064)
Emergency Law	-0.5593	-0.5702	-0.4882	-0.0893	-0.4709
	(0.4065)	(0.5179)	(0.3646)	(0.4462)	(0.4944)
Constant	0.0628	-1.9188	-3.3421	-7.8684*	-2.9883
	(5.7690)	(22.7487)	(4.7000)	(4.6111)	(4.8950)
Observations	168	168	168	168	168
F-test statistic	20.07	1598		39.63	1.570e+08
Prob >F	0	0		0	0
Number of city		17	17		17
City FE		YES		YES	YES
Year FE		YES		YES	YES
R-squared	0.7039			0.6497	
Overall		0.630	0.699		
Between		0.649	0.959		
Within		0.623	0.611		
Number of Instruments				1	149
Hansen test of overid. restrictions				1.385	4.31e-08
Hansen Prob>chi2				0.239	1
Arellano-Bond test					0.00625
Arellano-Bond test2					0.186
Endogeneity Test				0	

Robust standard errors in parentheses

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

[a] Logged variables is used when necessary.

All other notes sames as Table X

Table 7: The Effect of Terrorism on Private Investment 2001-2015: Non-Kurdish Public Investment

The effect of Terrorism on Private Investment 2001-2015: Non-Kurdish

	ESTIMATES OF MACROECONOMETRIC INVESTMENT MODEL				
Dep.Variable: Log of Private Investment [a]	POLS	Fixed Effects	Random Effects	IV-REG	AB-GMM
Terrorism Index	-0.1990*	-0.0264	-0.1886	-0.2240**	-0.1404
	(0.1189)	(0.0986)	(0.1158)	(0.1032)	(0.1686)
Lagged Private Investment	0.1851***	-0.0913	0.1856**	0.2940***	0.1719**
	(0.0607)	(0.0759)	(0.0748)	(0.0743)	(0.0811)
D.Total Public Investment	0.0349	-0.0479	0.0539		
	(0.1204)	(0.0917)	(0.1048)		
Market Size (GDP)	0.8470***	0.2032	0.8417***		0.7135***
	(0.1329)	(0.5736)	(0.1310)		(0.1823)
GDP Growth Rate	0.0831	0.0432	0.0937*	0.1186**	0.2410***
	(0.0668)	(0.0685)	(0.0525)	(0.0556)	(0.0813)
Population	-0.0073	-2.4396***	-0.0042	0.6610***	0.0600
	(0.1851)	(0.4391)	(0.1895)	(0.1421)	(0.2215)
Real Wage	-0.2939	0.7021	-0.2025	0.6022***	-0.3368
	(0.2661)	(0.6425)	(0.2202)	(0.1926)	(0.3136)
Deflator for Investment	0.8351	-3.3592*	0.4724		1.4871
	(0.9305)	(1.9672)	(0.7479)		(0.9266)
Openness	0.8502***	0.9649	0.8433**	1.1749***	1.1829***
	(0.2611)	(0.5806)	(0.3365)	(0.2855)	(0.3191)
Altitude of Province	-0.0000		-0.0000	0.0001	0.0000
	(0.0001)		(0.0002)	(0.0002)	(0.0002)
University	0.0737*	0.3861***	0.0858**	0.1338***	0.1262***
	(0.0429)	(0.0888)	(0.0397)	(0.0357)	(0.0408)
Literacy Rate	0.0502	0.0415	0.0493*	0.0634**	0.0285
	(0.0311)	(0.0392)	(0.0272)	(0.0313)	(0.0283)
Forestry	0.6345*		0.6264	0.8149**	0.6284
	(0.3341)		(0.4834)	(0.3702)	(0.5279)
Socioeconomic Index	0.1247	-1.3109***	0.1101	-0.2212	0.0778
	(0.1596)	(0.4677)	(0.2082)	(0.1815)	(0.2088)
Borderiis	-0.1899		-0.2007		-0.0759
	(0.1978)		(0.2407)		(0.2319)
Ratio of Kurdish Population	0.0497***		0.0498*	0.0387**	0.0497*
	(0.0163)		(0.0258)	(0.0158)	(0.0261)
Emergency Law	-0.0455	0.4280	-0.0016	-0.0374	-0.2702
	(0.2505)	(0.2834)	(0.1830)	(0.1648)	(0.3409)
Constant	-7.1134*	40.2135***	-7.4486**	-6.5628*	-3.3088
	(3.7185)	(10.2775)	(3.1250)	(3.7600)	(3.2502)
Observations	494	494	494	494	494
F-test statistic	63.33	54.07		187.6	90.50
Prob >F	0	0		0	0
Number of city		47	47		47
City FE		YES		YES	YES
Year FE		YES		YES	YES
R-squared	0.6821			0.6542	
Overall		0.0587	0.682		
Between		0.463	0.923		
Within		0.494	0.406		
Number of Instruments				1	162
Hansen test of overid. restrictions				0.601	36.69
Hansen Prob>chi2				0.438	1
Arellano-Bond test					1.10e-05
Arellano-Bond test2					0.813
Endogeneity Test				0.330	

Robust standard errors in parentheses

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

[a] Logged variables is used when necessary.

All other notes sames as Table X

The most prevailing coefficient is in Table 8, and it indicates that the current level of public investment depends positively on its level and rate of growth this time last year. This suggests

that a continuous pattern dominates the dynamics of public investment. Moreover, a 10% increase in last year's public investment will lead to an 8.5% increase in public investment this year. This prediction supports claims that public investment has a continuous pattern and it is pre-determined.

Following similar methods of private investment, here two regressions are estimated for public investment; one with the data for Kurdish cities only and one with the data for Non-Kurdish only, by splitting the data in two parts. The results do seem to suggest that terrorism is not a strong predictor of public investment for Kurdish-populated cities (range -0.002;0.12) and Non-Kurdish (-0.01;0.05).

The overall picture from Tables 8 to 10 is that the economic variables, especially previous years of public investment dominate the evolution of public investment in the cities. The results here suggest that, to the extent that government investment decisions are not based on both economic factors and political instability, they are largely influenced by the political decision-making process and are pre-determined.

Perhaps the most interesting feature of the regression results is the role played by measures of political instability. The terrorism variable has a significantly negative impact on private investment, but not on public investment. The figures for private investment are higher than those for public investment, which is consistent with the idea that private investment is more sensitive to political instability, as suggested in Section I.

The effect of terrorism in public investment is lower than private investment can be attributed to different factors. First of all, security measures of governments can inflate the public investment, such as building roads and transportation systems, building houses for government officials and increasing military-related expenditures. Secondly, public investment decisions are set in advance by state planning organizations and they are mostly part of the long-term plans. For example, former State Planning Agency –then incorporated to Ministry of Development– designs Five-Years Plan according to the goals set by the government. The famous example is the GAP Project in eastern part of Turkey, which is one of the largest power generating, irrigation, and development projects of its kind in the world, covering 3 million hector of agricultural land. This is over 10% of the cultivable land in Turkey; the land to be irrigated is more than half of the

presently irrigated area in Turkey. The GAP project on the Euphrates and Tigris Rivers encompasses 20 dams and 17 hydroelectric power plants (Yuksel, 2015). The project started early in the 1980s, but is still in progress. According to the official GAP website, as of 2015, 74% of energy investment has finished (GAP, 2016). This example confirms that government investments are less volatile than private investment because they are pre-planned and have a pre-approved budget. Third, although public investment is less affected than private investment from terrorism, one should also look at the actual investment completed and the efficient use of public investment. For example, the government invests in schooling by constructing more school buildings, but as an indirect effect of terrorism, students are not able to attend the schools and teachers are not willing to teach those schools. Thus, there exists a lot of empty school buildings without any teachers and students. For example, according to the government news agency, 255 schools in 5 towns in Eastern Turkey were closed due to the rise of terrorism in 2015 (AA, 2017). Fourth, distributions of public investment across cities may not be optimal in terms of the theory of economic allocation. That means that political decision-making of investment exceeds efficient allocation of investment. For example, although there can be terrorism within the city, local government representatives can build a factory that is inappropriate to that region, i.e., building oil refinery in agriculture land. This is obviously a sunk investment. Even worse, there are an abundance of unfinished government projects and a waste of resources. The government does not channel resources to productive sectors. Corrupted politicians may attract public investment to their cities although neighboring cities might be more plausible to that kind of investment. Fifth, there is always the case of the political business cycle where, during election seasons, government investment is inflated despite rising of political instability. Last year's public investment strong predictor of the current public investment (84%), that means historically, the government plans city's public investment levels according to its historical allocated resources. The allotted investment ratio might not have updated with new conditions such as economics, population and socio-political structure of the city. Hence, identifying new public investment versus continuing public investment and how they are related to terrorism would be a valuable contribution to the literature.

This section delves into the evidence on the economic determinants of investment in different types of investment, and on the dynamic interaction of public and private investment. Now the section proceeds to the sensitivity analyses.

5.5 Robustness analysis

5.5.1 Models with Total Casualties instead of the Terrorism Index

This section executes some alternative models to verify the negative effect of terrorism upon investment. The previous section addresses endogeneity and the reverse causality issue by running an IV estimation and the Arellano-Bond "Generalized Method of Moments." However, this negative effect can simply be an artifact of the variables used or the estimators employed. Thus, this section takes these concerns into account in several ways. First, it replaces the terrorism index with the causality count measure of terrorism with an indicator of terrorism that takes the severity of these acts into consideration. Second, it employs alternative model specifications for public investment by disintegrating it to the sectoral level.

If the theoretical argument is correct, and if the previous results are robust, terrorist casualties should continue to exert a negative influence over Investment. Table 10-11, hence, examines whether the results reached in the prior models hold up when terrorism is measured by the number of casualties these attacks inflict (Powers & Choi, 2012).

The overall results reported in this table mirror those found in Table 4-6. Table 10 displays that terrorism continues to have a statistically significant and negative effect upon private Investment even when the variable is measured by the number of casualties from terrorism rather than through a terrorism index. The A-B GMM model predicts that a 10% increase of causalities of terrorism reduces private investment by 1.8%. Stated simply, the negative effect of terrorism upon private investment is robust to various operationalizations of the terrorism variable.

Table 8: The Effect of Terrorism on Public Investment 1981-2015: All Cities

The effect of Terrorism on Public Investment 1981-2015: All Cities

	ESTIMATES OF MACROECONOMETRIC INVESTMENT MODEL				
Dep.Variable: Log of Public Investment[a,b]	POLS	Fixed Effects	Random Effects	IV-REG	AB-GMM[c]
Terrorism Index[b]	**-0.0147**	**-0.0121**	**-0.0140**	**-0.0749*** **	**-0.0349**
	(0.0291)	**(0.0233)**	**(0.0231)**	**(0.0290)**	**(0.0345)**
Lagged Public Investment	0.8466***	0.7202***	0.8482***	0.9082***	0.8491***
	(0.0199)	(0.0303)	(0.0240)	(0.0187)	(0.0311)
Market Size (GDP)	0.0702**	-0.1072	0.0686*	0.0403	0.0188
	(0.0330)	(0.0757)	(0.0354)	(0.0310)	(0.0795)
GDP Growth Rate	0.0319	0.0340*	0.0168	-0.0272	0.0290
	(0.0213)	(0.0170)	(0.0122)	(0.0199)	(0.0249)
Population	0.0661*	-0.2071*	0.0670*	0.0611*	0.0609
	(0.0367)	(0.1166)	(0.0382)	(0.0338)	(0.0781)
Real Wage Rate	0.0995**	0.2108***	0.1033**	0.2095***	0.1387**
	(0.0387)	(0.0553)	(0.0409)	(0.0364)	(0.0687)
Deflator for Investment	-0.0895	-0.1788	-0.1054	-0.3069**	-0.2501*
	(0.1374)	(0.1722)	(0.1140)	(0.1310)	(0.1495)
Openness	0.0162	0.0060	0.0184	-0.0066	0.1348
	(0.0687)	(0.1929)	(0.0675)	(0.0640)	(0.1139)
University	-0.0048	0.0276*	-0.0039	-0.0092	0.0155
	(0.0097)	(0.0142)	(0.0089)	(0.0090)	(0.0146)
Literacy Rate	0.0058*	0.0160***	0.0058*	0.0032	0.0042
	(0.0034)	(0.0039)	(0.0033)	(0.0032)	(0.0056)
Forestry	0.0125		0.0150	0.1068	-0.0156
	(0.0865)		(0.0945)	(0.0785)	(0.1307)
Socioeconomic Index	0.0017	0.0851	-0.0005	0.0144	0.0187
	(0.0217)	(0.1059)	(0.0214)	(0.0205)	(0.0382)
Borderiis	0.0050		0.0049		-0.0336
	(0.0397)		(0.0441)		(0.0578)
Ratio of Kurdish Population	0.0018*		0.0018**	0.0012	0.0016
	(0.0009)		(0.0009)	(0.0009)	(0.0015)
Emergency Law	0.0275		0.0268	0.1055*	0.0319
	(0.0590)		(0.0646)	(0.0567)	(0.0796)
Constant	-0.5103	7.5636***	-0.5854	-1.3601***	0.5566
	(0.4299)	(2.3282)	(0.4041)	(0.3979)	(1.2258)
Observations	1,336	1,336	1,336	1,336	1,336
F-test statistic	764.1	313.2		953.5	
Prob >F	0	0		0	
Number of city		67	67		67
City FE		YES		YES	YES
Year FE		YES		YES	YES
R-squared	0.8972	0.7579		0.8941	
Overall		0.805	0.897		
Between		0.912	0.992		
Within		0.758	0.749		
Number of Instruments				4	220
Hansen test of overid. restrictions				131	62.16
Hansen Prob>chi2				0	1
Wald chi2			27299		12731
Prob>chi2			0		0
Arellano-Bond test					3.48e-06
Arellano-Bond test2					0.123

Robust standard errors in parentheses

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

[a] Logged Independent variables is used when necessary.

[b] Some coefficients are not shown due to space restrictions.Please refer to stata log file.

[c] The Arellano–Bond estimator is a generalized method of moments estimator used to estimate dynamic panel data models

[d] The Sargan-Hansen test is a test of overidentifying restrictions.

[e] Arellano-Bond test; p-value of Arellano and Bond test for autocorrelation of order 2 and 3, respectively.

Table 9: The Effect of Terrorism on Public Investment 1981-2015: Kurdish

The effect of Terrorism on Public Investment 1981-2015: Kurdish

	ESTIMATES OF MACROECONOMETRIC INVESTMENT MODEL				
Dep.Variable: Log of Public Investment[a]	POLS	Fixed Effects	Random Effects	IV-REG	AB-GMM
Terrorism Index	**0.0026**	**-0.0093**	**0.0029**	**-0.0876****	**-0.1250**
	(0.0415)	**(0.0314)**	**(0.0316)**	**(0.0387)**	**(0.4288)**
Lagged Public Investment	0.8446***	0.7057***	0.8454***	0.8868***	-0.2019
	(0.0364)	(0.0379)	(0.0390)	(0.0342)	(0.3071)
Market Size (GDP)	0.0486	-0.0092	0.0469	-0.0270	-2.4366**
	(0.0956)	(0.1614)	(0.0828)	(0.0911)	(1.1019)
GDP Growth Rate	0.0632	0.0700	0.0562**	0.0063	1.4165
	(0.0416)	(0.0403)	(0.0265)	(0.0403)	(1.4626)
Population	0.0977	-0.0722	0.0992	0.1755*	-5.6591**
	(0.1024)	(0.2950)	(0.0953)	(0.0991)	(2.5358)
Real Wage Rate	0.1913**	0.2217**	0.1946***	0.3067***	1.7953*
	(0.0920)	(0.0910)	(0.0702)	(0.0814)	(0.9769)
Deflator for Investment	-0.9477***	-0.8431	-0.9483**	-0.6229*	-0.2946
	(0.3569)	(0.5017)	(0.4292)	(0.3507)	(1.2915)
Openness	-0.1304	1.2183	-0.1245	0.2424	0.0000
	(0.6791)	(1.3008)	(0.6179)	(0.5430)	(0.0000)
Altitude of Province	-0.0002**		-0.0002***	0.0000	0.0254**
	(0.0001)		(0.0001)	(0.0001)	(0.0107)
University	0.0426*	0.0636*	0.0426	0.0274	0.4116**
	(0.0249)	(0.0317)	(0.0326)	(0.0231)	(0.1854)
Literacy Rate	0.0107	0.0114	0.0106*	0.0014	0.0167
	(0.0072)	(0.0076)	(0.0059)	(0.0066)	(0.0323)
Forestry	-0.1089		-0.1050	0.3179	0.0000
	(0.3962)		(0.4996)	(0.3088)	(0.0000)
Socioeconomic Index	0.1535	0.2795	0.1506	-0.0165	7.6455**
	(0.1020)	(0.2585)	(0.1126)	(0.0922)	(3.5089)
Borderiis	-0.0107		-0.0107		99.5991**
	(0.0700)		(0.0718)		(40.6336)
Ratio of Kurdish Population	0.0017		0.0017	0.0017	0.7886**
	(0.0021)		(0.0018)	(0.0019)	(0.3232)
Emergency Law	0.0506		0.0507	0.1852**	-4.2705*
	(0.0889)		(0.0827)	(0.0790)	(2.2190)
Constant	-0.9699	4.3290	-1.0025	-1.5251	0.0000
	(1.0070)	(5.6399)	(0.9373)	(0.9622)	(0.0000)
Observations	342	342	342	342	342
F-test statistic	137.1	300.3		167.6	
Prob >F	0	0		0	
Number of city		17	17		17
City FE		YES		YES	YES
Year FE		YES		YES	YES
R-squared	0.8648	0.7808		0.8540	
Overall R-squared		0.816	0.865		
Between R-squared		0.977	0.987		
Within R-squared		0.781	0.774		
Number of Instruments				4	322
Hansen test of overid. restrictions				46.49	0
Hansen Prob>chi2				4.46e-10	1
Wald chi2					1.214e+06
Prob>chi2					0
Arellano-Bond test					0.263
Arellano-Bond test2					0.865

Robust standard errors in parentheses

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

[a] Notes are same as Table X.

Table 10: The Effect of Terrorism on Public Investment 1981-2015: Non-Kurdish

The effect of Terrorism on Public Investment 1981-2015: Non-Kurdish

	ESTIMATES OF MACROECONOMETRIC INVESTMENT MODEL				
Dep.Variable: Log of Public Investment[a]	POLS	Fixed Effects	Random Effects	IV-REG	AB-GMM
Terrorism Index	-0.0182	-0.0275	-0.0160	-0.0220	-0.0538
	(0.0438)	(0.0414)	(0.0399)	(0.0420)	(0.0542)
Lagged Public Investment	0.8282***	0.7130***	0.8307***	0.9124***	0.8456***
	(0.0258)	(0.0396)	(0.0329)	(0.0231)	(0.0306)
Market Size (GDP)	0.0589	-0.1231	0.0561	0.0352	0.0320
	(0.0401)	(0.0911)	(0.0409)	(0.0370)	(0.0504)
GDP Growth Rate	0.0376	0.0329	0.0138	-0.0318	0.0349
	(0.0273)	(0.0211)	(0.0162)	(0.0251)	(0.0229)
Population	0.0791*	-0.1890	0.0804**	0.0581	0.0694*
	(0.0452)	(0.1188)	(0.0379)	(0.0401)	(0.0413)
Real Wage Rate	0.0932*	0.2030**	0.1001*	0.2238***	0.0971*
	(0.0498)	(0.0813)	(0.0536)	(0.0467)	(0.0536)
Deflator for Investment	0.0200	-0.0662	-0.0123	-0.2933*	-0.2001
	(0.1887)	(0.1743)	(0.1532)	(0.1730)	(0.1259)
Openness	0.0233	-0.2164	0.0266	-0.0229	0.0692
	(0.0890)	(0.2807)	(0.1108)	(0.0805)	(0.1099)
Altitude of Province	0.0000		0.0000	-0.0000	0.0000
	(0.0000)		(0.0000)	(0.0000)	(0.0000)
University	-0.0048	0.0225	-0.0028	-0.0088	0.0140
	(0.0148)	(0.0150)	(0.0123)	(0.0133)	(0.0126)
Literacy Rate	0.0069	0.0203**	0.0066	0.0014	0.0065
	(0.0049)	(0.0086)	(0.0049)	(0.0045)	(0.0048)
Forestry	0.1326		0.1344	0.0783	0.1423
	(0.0996)		(0.0889)	(0.0878)	(0.1021)
Socioeconomic Index	-0.0725	-0.0545	-0.0749	-0.0071	-0.0886*
	(0.0484)	(0.1402)	(0.0517)	(0.0432)	(0.0466)
Borderiis	-0.0075		-0.0079		-0.0360
	(0.0725)		(0.0668)		(0.0576)
Ratio of Kurdish Population	0.0043		0.0041	0.0021	0.0072
	(0.0050)		(0.0045)	(0.0045)	(0.0046)
Emergency Law	0.0606		0.0621	0.0582	0.0798
	(0.0876)		(0.1163)	(0.0814)	(0.1146)
Constant	-0.2872	7.4379***	-0.3917	-1.2629**	0.1770
	(0.5682)	(2.4744)	(0.4953)	(0.5076)	(0.5475)
Observations	929	929	929	929	929
F-test statistic	340.5	217.4		441.4	
Prob >F	0	0		0	
Number of city		47	47		47
City FE		YES		YES	YES
Year FE		YES		YES	YES
R-squared	0.8704	0.7553		0.8648	
Overall R-squared		0.753	0.870		
Between R-squared		0.862	0.990		
Within R-squared		0.755	0.747		
Number of Instruments				4	212
Hansen test of overid. restrictions				88.54	42.29
Hansen Prob>chi2				0	1
Wald chi2					10378
Prob>chi2					0
Arellano-Bond test					8.65e-05
Arellano-Bond test2					0.124

Robust standard errors in parentheses

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

[a]Notes are same as Table X.

The same model is estimated with public investment, but for all cities. The overall results reported in this table mirror those found in Table 7. Table 11 shows that terrorism continues to have a detrimental effect upon public Investment, but significant only for the IV estimation. The IV model predicts that a 10% increase of causality reduces public investment by 0.4%.

5.5.2 Public Investment-Sectoral Level

The public investment regression tables do not give as strong of results as private investment estimations. Several rationalizations are offered above. This research raises questions about some sectors of public investment are not affected by terrorism since they somehow are related to security measures. For instance, if terrorist acts increase drastically, the government may want to increase the public housing investment to establish safe zones for government officials.

For further robustness check, a Pooled OLS Model-verified by the A-B GMM model-estimated for each sector to see how this sector are affected separately by terrorist acts. It is evident from Table 13 that terrorism affects public investment sectoral structure. Terrorism affects human capital investment (e.g., Education, Health) and productive nature of the economy (e.g., Agriculture, Energy, and Transportation, other). These resources often diverted to unproductive and inefficient areas such as housings. It seems that public manufacturing and tourism industries are not affected by terrorism, which is in contradiction to the literature. Digging more into the data reveals that the share of these sectors in public investment is already very small so they are not volatile from the political situations. For example, the share of tourism is less than 1% when this amount is allocated evenly for cities –every city receives less than $3 million for tourism investment.

In summary, based on these estimations, protracted terrorism has negative effects on private and public investment opportunities. Public investment in different sectors does not appear to respond to terrorism in a homogeneous manner, and its ability to absorb or discount future risk appears to be influenced by other economic or political factors. Overall, in consonance with past research by others, this study has shown a significant and consistent relationship between terrorist violence and a decline in investment.

Table 11: The Effect of Total Casualties on Private Investment

The effect of Terrorism Casualties on Private Investment 2001-2015

	ESTIMATES OF MACROECONOMETRIC INVESMENT MODEL											
	All Cities			No Outlier			Kurdish			Non-Kurdish		
Dep.Variable: Log of Private Investment[a,b]	POLS	IV-REG	AB-GMM	POLS	IV-REG	AB-GMM	POLS	IV-REG	AB-GMM	POLS	IV-REG	AB-GMM
Log of Number of Casualties	**-0.1252*** **	**-0.1324** **	**-0.1655*** **	**-0.1206** **	**-0.1436** **	**-0.1425** **	**-0.1598**	**-0.1685**	**-0.1881*** **	**-0.1040** **	**-0.0906**	**-0.0705**
	(0.0435)	**(0.0564)**	**(0.0539)**	**(0.0523)**	**(0.0677)**	**(0.0661)**	**(0.0966)**	**(0.1257)**	**(0.0636)**	**(0.0527)**	**(0.0564)**	**(0.0785)**
Lagged Private Investment	0.2243***	0.3023***	0.1441**	0.2116***	0.3039***	0.1488**	0.0822	0.2310***	0.0733	0.1841***	0.2941***	0.1277*
	(0.0448)	(0.0535)	(0.0694)	(0.0457)	(0.0547)	(0.0720)	(0.0853)	(0.0834)	(0.1508)	(0.0608)	(0.0743)	(0.0737)
Market Size (GDP)	0.7402***		0.8742***	0.8543***		0.9962***	1.5079***		1.6114***	0.8455***		0.7484***
	(0.1138)		(0.2472)	(0.1214)		(0.2191)	(0.5537)		(0.4681)	(0.1328)		(0.1509)
GDP Growth Rate	0.1517**	0.1500***	0.1296*	0.1533**	0.1498***	0.1130*	0.2705	0.2817	0.1779	0.0858	0.1203**	0.0292
	(0.0624)	(0.0536)	(0.0779)	(0.0633)	(0.0552)	(0.0680)	(0.2334)	(0.2277)	(0.2458)	(0.0664)	(0.0554)	(0.0910)
Population	0.1495	0.7494***	0.0912	0.0744	0.7561***	-0.0073	-0.3499	1.0175***	-0.4475	-0.0031	0.6663***	0.0394
	(0.1442)	(0.0973)	(0.2352)	(0.1475)	(0.1003)	(0.2360)	(0.5088)	(0.1173)	(0.3662)	(0.1855)	(0.1422)	(0.2219)
Real Wage	-0.3646	0.6737***	-0.6316	-0.4481*	0.7057***	-0.7309	-1.7966**	1.2036**	-2.1625***	-0.2960	0.5927***	-0.0810
	(0.2444)	(0.1713)	(0.4281)	(0.2563)	(0.1824)	(0.4538)	(0.8405)	(0.4861)	(0.7557)	(0.2667)	(0.1922)	(0.3492)
Deflator for Investment	2.1374***		2.8318**	2.0108**		2.6372**	7.7177**		9.9318***	0.8674		0.7590
	(0.8076)		(1.1892)	(0.8266)		(1.1745)	(3.5352)		(3.4443)	(0.9353)		(1.3577)
Openness	0.7697***	0.9972***	0.8429***	0.7534***	0.9861***	0.9277**	1.3821	3.2983**	-0.0978	0.8471***	1.1585***	1.1972**
	(0.2079)	(0.2292)	(0.2740)	(0.2378)	(0.2565)	(0.3854)	(1.7693)	(1.3871)	(1.0091)	(0.2626)	(0.2856)	(0.5332)
university1	0.0212	0.1210***	0.0222	0.0455	0.1296***	0.0464	0.0747	0.3344***	-0.0280	0.0719*	0.1345***	0.1387*
	(0.0342)	(0.0309)	(0.0542)	(0.0362)	(0.0345)	(0.0612)	(0.1606)	(0.1126)	(0.1474)	(0.0430)	(0.0357)	(0.0743)
Ratio of Kurdish Population	0.0065*	0.0066**	0.0079	0.0027	0.0070*	0.0033	-0.0169*	-0.0074	-0.0143**	0.0496***	0.0386**	0.0758**
	(0.0036)	(0.0032)	(0.0066)	(0.0042)	(0.0037)	(0.0066)	(0.0087)	(0.0078)	(0.0059)	(0.0163)	(0.0158)	(0.0355)
Constant	-9.5608***	-9.3484***	-8.9903**	-9.0127***	-9.4057***	-8.0133**	-0.8966	-8.0445*	-1.2272	-7.5790**	-6.8397*	-2.1591
	(2.8181)	(2.6212)	(4.3253)	(2.8586)	(2.7135)	(3.9123)	(6.0520)	(4.7158)	(4.6726)	(3.7869)	(3.7842)	(6.0998)
Observations	695	695	695	662	662	662	168	168	168	494	494	494
Number of city			67			64			17			47
City FE		YES	YES		YES	YES		YES	YES		YES	YES
Year FE		YES	YES		YES	YES		YES	YES		YES	YES
R-squared												
Overall	98.86	113.3		75.43	95.77		19.34	38.48		62.54	187.6	
Between												
Within												
Number of Instruments		1	80		1	78		1	75		1	76
F-test statistic	0.7296	0.7107		0.7009	0.6767		0.7013	0.6525		0.6822	0.6546	
Prob >F	0	0		0	0		0	6.77e-11		0	0	
Wald chi2			1521			922.8			696			1072
Prob>chi2			0			0			0			0
Hansen test of overid. restrictions		0.127	54.96		0.212	50.36		0.768	4.70e-09		0.0656	30.67
Hansen Prob>chi2		0.722	0.625		0.645	0.721		0.381	1		0.798	0.997
Arellano-Bond test			1.74e-05			1.10e-05			0.00180			0.000307
Arellano-Bond test2			0.887			0.918			0.466			0.486
			1.74e-05			1.10e-05			0.00180			

Robust standard errors in parentheses

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

[a] Notes: Same as Table 5.3

[b] Statistics of Fixed and Random Effect omitted because of limited space. Please refer Stata Log file if you need to access them.

Table 12: The Effect of Total Casualties on Public Investment

The effect of Terrorism Casualties on Public Investment 1981-2015: ALL CITIES

	ESTIMATES OF MACROECONOMETRIC INVESTMENT MODEL		
Dep.Variable: Log of Public Investment[a,b]	POLS	IV-REG	IV-GMM
Log of Number of Casualties	**-0.0145**	**-0.0393*** **	**-0.0181**
	(0.0136)	**(0.0133)**	**(0.0154)**
Lagged Public Investment	0.8467***	0.9083***	0.7690***
	(0.0199)	(0.0187)	(0.0405)
Market Size (GDP)	0.0701**	0.0409	-0.1875
	(0.0329)	(0.0309)	(0.1160)
GDP Growth Rate	0.0326	-0.0272	0.0431*
	(0.0212)	(0.0198)	(0.0234)
Population	0.0665*	0.0631*	-0.1387
	(0.0365)	(0.0334)	(0.2215)
Real Wage	0.0989**	0.2068***	0.2555***
	(0.0387)	(0.0364)	(0.0796)
Deflator for Investment	-0.0885	-0.3178**	-0.2575
	(0.1381)	(0.1313)	(0.2426)
Openness	0.0151	-0.0159	0.0135
	(0.0680)	(0.0632)	(0.4756)
university1	-0.0047	-0.0081	0.0333
	(0.0097)	(0.0090)	(0.0203)
Ratio of Kurdish Population	0.0019**	0.0014	0.0000
	(0.0009)	(0.0009)	(0.0000)
Observations	1,336	1,336	1,269
F-test statistic	764.2	943.8	153.7
R-squared	0.8973	0.8942	
Overall			
Between			
Within			
Number of Instruments		4	143
Arellano-Bond test			7.49e-06
Arellano-Bond test2			0.148
Hansen test of overid. restrictions			64.72
Hansen Prob>chi2			1
Robust standard errors in parentheses			

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

[a]Notes: Same as Table 1.

[b]Statistics of Fixed and Random Effect omitted because of limited space.
Please refer Stata Log file if you need to access them.

Table 13: Public Investment-Estimation of Sectoral Level and Share of Sectors in Public

Sign of Terrorism Index Coefficient Different Public Sectors Regressions										
Sign of Coefficient of Terrorism Index[a,c]	Agriculture	Mine	Manifacturing	Energy	T&C	Tourism	Housing	Education	Health	Other
All Cities Except Outlier[b] Cities	-	+	+	-	-	+	+	-	-	-
Kurdish Populated Cities	-	-	+	-	-	-	+	-	-	-
Non-Kurdish Cities	-	+	+	+	-	+	+	-	-	+

[a] The model is estimated by Pooled OLS and also verified with System GMM regression using stata module xtabond2.
I replicate my benchmark Public Investment GMM Model with sectors using same regression set-up & independent variables.
[b] Outlier cities are three most populated cities in Turkey; Istanbul, Ankara, Izmir.
[c] I run similar model with all cities and total casualties variables which yield same result, I did not include here for sake of simplicity.

Share of Sectors-Public Investmet-2015		
Turkey	**Quantity**	**Ratio %**
Total Public Investment	$22,893,405,672	100.0%
T&C	$6,628,143,598	29.0%
Other	$5,482,949,939	23.9%
Education	$3,894,444,771	17.0%
Agriculture	$2,601,573,546	11.4%
Energy	$1,445,633,575	6.3%
Health	$1,443,619,745	6.3%
Mine	$921,895,006	4.0%
Manifacturing	$364,279,251	1.6%
Tourism	$166,512,671	0.7%
Housing	$124,717,696	0.5%

6 Conclusion

It has been possible to estimate the effect of protracted domestic terrorism in Turkey for the period 1981-2015, disaggregating investment into public and private investment. This model is based on a standard economic representation of a profit-maximizing firm, but also incorporates time series reflecting the degree of political instability in Turkey following the PKK insurgency. The construction of these series is motivated by recent political science research into factors affecting perceived political uncertainty in Turkey. Among the economic factors explaining variations in investment over time, the strongest effects are on the capital cost and GDP growth.

The coefficients on economic variables are stable over time, indicating that the level of political instability in Turkey is not so great as to undermine basic economic relationships.

Using A-B GMM Model, this study predicted that prolonged terrorism significantly reduces the level of investment in conflict zones. Results are robust across a number of alternative specifications. Alternative methods can be proposed to overcome the challenge of econometric drawbacks such as: i. Synthetic control group method (SCM), ii. DID-matching on panels of life courses before treatment occurs, iii. The FD-IV estimators that make use of lagged values of endogenous and predetermined independent variables (Finkel, 2015).

The results of this paper are consistent with previous cross-country work on the impact of political instability on investment. Protracted terrorism affects the private investment level substantially. Either long-lasting peace between or total end of conflict in Turkey can provide a significant improvement in investment performance for private investors.

Several measures can be taken by policy-makers to curb the negative impacts of terrorism on business and investment activity in affected provinces, such as policies moderating the terrorism-induced fear of business owners and consumers, and compensating for the increased costs associated with terrorism-induced risks through incentives. The government should encourage new investments in provinces where terrorism has had an impact. Incentives for affected provinces should be strengthened more to support new firm establishments. Since terrorism has an adverse impact on new firm establishments, security and fiscal support should be increased particularly in the provinces where terrorist attacks are concentrated. On the other hand, businesspeople who employ a considerable amount of capital or labor in South-Eastern provinces should granted some privileges, such as tax deductions, and subsidies. The measures taken to overcome the direct and indirect costs of terrorism will help eliminate impacts of terrorist attacks on local economic activity (Polat and Uslu, 2013).

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