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ESSAYS IN PUBLIC ECONOMICS AND ECONOMICS OF TERRORISM

by

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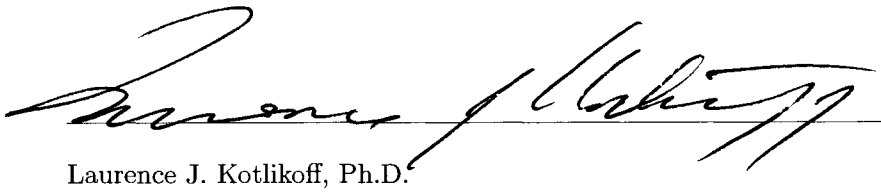
First Reader 

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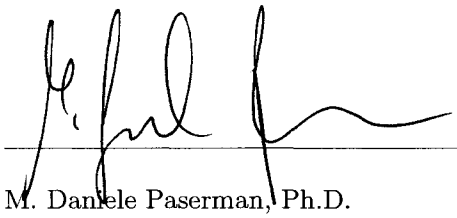
Second Reader 

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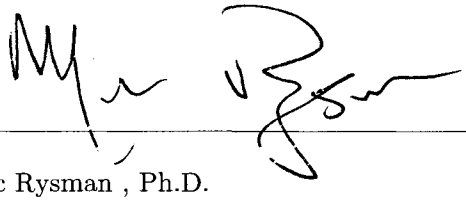
Third Reader 

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Dedication

To my father, who will always live in my heart,

and

to my baby boy who has been the joy of my life, even before he was born.

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Aybars Derin and Alper Derin, my sister-in-law Narin Derin, my lovely nephew Ahmet Alp, beautiful niece Zeynep Derin and all the other family members for their unconditional support and encouragement during my Ph.D. studies.

I dedicate this dissertation to two very special men: Firstly to my father, Ahmet Derin, who will always live in my heart. To lose him was the biggest sadness in my life, but knowing that he had always believed in me and my success gave me great power during my studies. I also would like to dedicate this dissertation to my baby boy who worked alongside me in this dissertation and showed his support with his constant movements and kicks. He has been the greatest joy of my life even before his birth.

ESSAYS IN PUBLIC ECONOMICS AND ECONOMICS OF TERRORISM

(Order No.)

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ABSTRACT

This dissertation consists of three different papers in public economics and economics of terrorism. *"Does Terrorism Have Economic Roots?"* investigates the roots of international, domestic, and separatist terrorism using a new, extensive, multi-country panel data set obtained from MIPT (Memorial Institute of Prevention of Terrorism). I augment the MIPT data by recording the target country and the terrorist's country of origin. I also classify each terrorist incident as international, domestic, or separatist. International terrorism refers to terrorism committed by foreign nationals. Domestic terrorism refers to terrorism committed by domestic nationals. Separatist terrorism is committed by domestic nationals engaged in separatist causes. Using a panel data analysis with country fixed effects, I find striking results at considerable odds with the literature. Whereas the previous literature finds that terrorism is unrelated to economic conditions, I find that the richer the country, the fewer the terrorist attacks committed abroad by the country's nationals. Similarly, I find that when a country is richer, the country's nationals commit fewer terrorist attacks at home. I build an entirely new data set with regional GDP of separatist regions and find that the higher the GDP of the separatist region, the fewer the terrorist attacks committed by native separatists.

"Separatist Terrorism and Poverty in Southeastern Turkey" investigates the economic roots of separatist terrorism in Turkey. The political conventional wisdom is that poverty in highly Kurdish-populated, southeastern Turkey is one of the most important causes of separatist terrorism and Turkish-Kurdish conflict in Turkey. Therefore, many economic policies have been implemented to improve the economic conditions in the southeastern part of the country. Us-

ing the Global Terrorism Database, I find that there is a causal relationship between economic conditions in southeastern Turkey and separatist terrorism. I do not find that improvements in economic conditions in relatively poorer southeastern Turkey cause a decrease in separatist terrorist incidents in Turkey; on the contrary, it increases the separatist terrorist incidents significantly in the following year.

"Charitable Giving under Inequality Aversion" focuses on the relationship between voluntary giving and the degree of inequality aversion. Our model suggests that voluntary giving increases in the degree of inequality aversion for individuals of higher than average income. However, the sign of the effect is reversed for individuals who are poorer than the average. Contributions are monotonically increasing in the income level, holding the degree of inequality aversion constant. We test our theoretical findings using the General Social Survey data on the United States and show that empirical results support our predictions.

Contents

[1] **Co-authored with Neslihan Uler**

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List of Abbreviations

CEPII	French Research Center in International Economics
DAP	Eastern Anatolia Development Project
DHKP/C	Revolutionary People's Liberation Front
GAP	Southeastern Anatolian Project
GDP	Gross Domestic Product
GSS	General Social Survey
GTD	Global Terrorism Data Base
IBDA/C	Islamic Great Easter Raider's front
MIPT	Memorial Institute of Prevention of Terrorism
ML	Maximum Likelihood
NB	Negative Binomial
OLE	Ordered Logit Estimation
PIJ	Palestinian Islamic Jihad
PKK	Partiya Karkeren Kurdistan (Kurdistan Workers Party)
PQML	Poisson-Quasi Maximum Likelihood
TIJ	Turkish Islamic Jihad
TIKKO	Turkish Workers and Peasant's Liberation Army
TKP/ ML	Turkish Communist Party/ Marxist-Leninist Organization
VAR	Variance Autoregression

Chapter 1

Does Terrorism Have Economic Roots?

1.1 Introduction

Does economic deprivation lead to terrorism? This question has increasingly been asked in the media and in politics following the September 11, 2001 terrorist attacks. The conventional wisdom among policy makers is that poverty creates terrorism but several empirical studies have challenged this view. Krueger and Maleckova, 2003; Berrebi, 2003; Abadie, 2004; Piazza, 2006; Feldman and Ruffle, 2007; Krueger and Laitin, 2007; Kurrild-Klitgaard et. al., 2006; Dreher and Gassebner, 2007; Testas, 2004 have all found little or no correlation between economic conditions and terrorism. In this paper, I will reassess the evidence on the economic roots of terrorism. I question whether international, domestic, and separatist terrorism have economic causes by using the MIPT (Memorial Institute for Prevention of Terrorism) – a new, extensive, multi-country panel data set.

To my knowledge, this is the first paper that tests the economic roots of international terrorism, as well as domestic terrorism, and categorizes separatist terrorism individually. International terrorism refers to terrorism committed by foreign nationals. Domestic terrorism is terrorism committed by domestic nationals. Separatist terrorism is committed by

domestic nationals engaged in separatist causes. This paper uses cross-country and panel data analysis to estimate the effect of economic conditions on targets and origins of international, domestic, and separatist terrorism. The findings are striking, and at considerable odds with the literature.

Several studies have already investigated the economic roots of terrorism. Considering the supply side of terrorism, Berrebi (2003) finds that high standards of living and educational levels are positively associated with participation in Hamas and Palestinian Islamic Jihad (PIJ) terrorist activities in Israel. Krueger and Maleckova (2003) find that the connection between poverty, education and terrorism is indirect, complicated and probably quite weak. A few studies on international terrorism find that economic development and social welfare policies are important determinants terrorism. (Burgoon, 2006; Li and Schaub, 2004; Li 2005)[1].

Several cross-country studies has shown that terrorism has no economic roots. Among these studies the most influential ones are Abadie(2004) and Krueger and Laitin(2007). Abadie (2004) shows that terrorist risk is not significantly higher in poor countries when we control for political freedom. The terrorist risk data used by Abadie (2004) includes information on the country of occurrence but not on the target countries and on the countries of origins of terrorism. Therefore the data confounds between different types of terrorism.

Among the cross-country studies, Krueger and Laitin (2007) is the only paper that differentiates between country of occurrence, target country and the terrorist's country of

[1]These studies focus on country of occurrence but not the targets or origins of international terrorism. These studies also control for government capacity in the regressions. Krueger and Laitin (2007) mentions that government capacity largely reflects the GDP per capita. Therefore, the sizeable positive impact of government capabilities found by the authors is likely to offset the claimed negative effect of economic development on terrorism.

origin. The authors use a US State Department data set on international terrorism and find that a country's economic performance is not a statistically significant predictor of international terrorist attacks committed by that country's nationals. On the other hand, it appears that it is mainly the wealthy countries that are the targets of international terrorism. While the results in Krueger and Laitin (2007) are indicative, this paper suffers from some potential shortcomings. The US State Department data set used in the paper has many deficiencies including the ambiguity of the definitions used for some variables as well as errors and omissions in the data set, acknowledged by the authors themselves. For example Krueger admits that "...these data (US State Department Data) have serious problems, only some of which, as I detail below can be addressed" (Krueger, 2007, pp.66). Moreover, Krueger and Laitin (2007) use only international terrorist incidents. Most of the terrorist incidents, however, are not international but domestic and separatist incidents. My classification of the MIPT data suggests that between 1998 and 2006 only 8 percent of all terrorist incidents are international, but 57 percent and 35 percent of all incidents are domestic and separatist in nature, respectively. Therefore it is essential to study the determinants of domestic and separatist terrorism, as well.[2]

The weaknesses with the data sets used in the previous literature highlight the importance of testing the economic roots of terrorism with an alternative data set. The MIPT data set has not been used in a study of targets and origins of terrorism before.[3] The MIPT

[2] Using the US State Department data, Piazza (2006) also finds that economic well-being is not related with the number of terrorist incidents occured in that country.

[3] Abadie(2004) performs some robustness checks using the MIPT data but the study does not differentiate between targets and origins of terrorism and includes no information on international terrorism versus domestic and separatist incidents. Dreher and Gassebner (2007) uses MIPT data but they do not differentiate between different types of terrorism, as well as target's country and terrorist's country of origin. Feldman and Ruffle(2007) use the MIPT data but they focus on the terrorist organizations carrying out attacks.

data set includes information on the country in which the attack occurred and the terrorist organization responsible for the attack, to the extent that it is known. It includes a small description of the incident, but includes no information on the target country or terrorist's country of origin. I augment the MIPT data by classifying the target country and the terrorist's country of origin for each one of 31,662 terrorist incidents listed in MIPT from 1972 to 2006. I also classify each incident as either international, domestic, or separatist. As the data set includes a longer time horizon than the previous data sets, from 1972 to 2006, I will be able to employ econometric techniques that more convincingly isolate country-specific factors that may affect terrorism.

The previous literature on the targets and origins of terrorism focuses on cross-country estimations. I replicate the cross-country estimations with the MIPT data. Using the same sample period and the same set of countries as Krueger and Laitin (2007), I find that international terrorism does not originate from poor countries but targets rich countries. I also find the same results using cross-section estimations between 1998 and 2006.[4] The novelty of the paper is that the larger panel data allows me to perform longitudinal analysis. Panel data also allows me to control for the impact of omitted variables, through the inclusion of country-fixed effects. This is important in the analysis of terrorism as we can think of many other variables that can affect terrorism and for which we were not able to control. Panel data estimations with fixed effects show a substantially different picture. I find that countries that get richer over time export fewer terrorist attacks. At the same time, countries that grow richer over time do not attract more terrorist attacks. This result

[4] Cross-country estimations are also performed between 1972 to 2006. I will report the estimation results between 1998 and 2006 for comparison purposes as domestic and separatist terrorism data is available only between 1998 to 2006. The data set may also be more reliable after 1998.

holds for yearly panel data as well as the panel data that I generate for five-year periods.

Cross-sectional estimations suggest that domestic terrorism does not significantly occur in poor countries. On the other hand, using panel data with country fixed effects I find that countries that get richer over time produce fewer domestic terrorist attacks. Unlike the previous cross-country literature that considers separatist terrorism as a part of domestic terrorism (like the incidents in Turkey and Sri Lanka) or international terrorism (like the incidents in Kashmir and West Bank/ Gaza), I consider them separately as the content and motivation might be quite different from international and domestic incidents. Since some countries such as Israel, India, Spain, United Kingdom, Sri Lanka, and Turkey have suffered from separatist incidents for many years, these events necessitates a special attention of their own. In order to find if economic well-being has an effect in separatist terrorism, we first need to know the economic conditions in separatist regions in the world and this information is not available directly in any data source. I build an entirely new data set with regional GDP of separatist regions that allows me to look at the determinants of separatist terrorism. I find that separatist terrorists tend to originate from poor areas. In summary, the existing conventional wisdom in economic literature on the lack of economic roots of terrorism may not be as robust as we thought, and some of the data I use suggest that low levels of development do lead to more terrorism.

This chapter is organized in 5 sections. In section 1.2, I describe the data set and its categorization. Section 1.3 explains my empirical strategy. The results of the empirical estimations for international, domestic, and separatist terrorism are reported in section 1.4. I summarize my main conclusions in section 1.5.

1.2 Data

For the empirical investigation, I use the data on terrorism, GDP per capita, population, civil liberties, religion, and other control variables for up to 138 countries for the years 1972–2006. More technical information on the description of the variables used and summary statistics is presented in Tables 1.1 and 1.2 respectively. The empirical literature on determinants of terrorism focuses primarily on the number of terrorist incidents.[5] Similarly, I use the number of significant terrorist incidents as the dependent variable in our estimations. I define significant terrorist incidents as incidents with fatalities. Data on the number of terrorist incidents with fatalities are obtained from the MIPT (Memorial Institute for Prevention of Terrorism). Terrorism is defined in the data base as violence, or the threat of violence, calculated to create an atmosphere of fear and alarm. Terrorist acts are also intended to produce effects beyond the immediate, having long-term psychological repercussions on a particular victim audience.

The MIPT is a non-profit organization dedicated to prevention of terrorism on US soil. The MIPT Terrorism Knowledge Base has more than 35 years of terrorist incidents data . MIPT integrates several trustable data bases on terrorism. Between 1968 and 1998 the data base includes only international incidents. The 1998-2007 period, on the other hand, includes not only international incidents but also domestic and separatist terrorist incidents. As I mentioned earlier as well, the MIPT data base covers a longer period of time (1968-2007) than the US State Department data set (1997-2003).[6] Within the same time period,

[5] Alternatively, I could use the number of terrorist incidents divided by population in millions (proxy for the number of terrorists per million) as the dependent variable, but this specification is more restrictive than the specification I use. Therefore I will use the number of terrorist incidents as the dependent variable and control for population in regressions.

[6] At the time I started my research, MIPT included data from January 1968 to September 2007.

the MIPT includes more incidents than the US State department data set. Between 1997 and 2002, the US State Department data set lists 781 significant international incidents; the MIPT data base lists 8172 incidents- 831 of them purely international, 3890 of them are separatist, and 3418 of them are categorized as domestic events.

Using the MIPT data set had its own challenges. The data set was not categorized in terms of the target country and terrorist's country of origin. I categorize the target country and the perpetrator's country of origin in each of 31662 terrorist incidents from the description of each event. The rules for the categorization of terrorist incidents is given in Table 1.3. The country of occurrence is the country/area where the terrorist incident took place and is already given in the data set. Target Country is the country/area of origin of the main target of terrorist incidents. If the main target of the incident is not known, the target country is categorized as the one with the highest number of fatalities. If the main target country is mentioned in the event description it is set as the target even though that country did not have any fatalities in the incident. The perpetrator's country/area is the terrorist's country of origin. If the perpetrator's origin is not mentioned explicitly in the event description, it is taken as the country of origin of the terrorist group responsible for the attack. Unfortunately, in most cases the terrorist group responsible for the attack is not known. If the terrorist group and the perpetrator's origin are not known, the perpetrator's country is taken as the country of occurrence. There are some complicated cases where the perpetrator's origin is not known for sure; in those instances the perpetrator's country is set as unknown.

The terrorist events are also categorized as international, domestic, and separatist. US State Department data set, used by Krueger and Laitin (2007), defines international terror-

ism as terrorist incidents involving citizens or territory of more than one country. Although this definition helps me to compare my findings with previous literature, it might be misleading and limited. This definition categorizes some domestic and separatist incidents as international if a foreign national is involved, killed, or injured in the incident. For example, if an American tourist is killed by chance in a domestic bombing in Algeria, and the main target is not the US, the incident is coded with this definition as an international incident not separatist or domestic. Therefore, throughout the paper, I will define international terrorism as the terrorist incidents where the target's country is different from terrorist's country of origin.[7]

Terrorist incidents perpetrated by local nationals against a purely domestic target are coded as domestic terrorist incidents. Separatist incidents are excluded from domestic incidents even though in most cases the official citizenship of the target and perpetrator is the same. I define terrorist incidents by separatist movements that aspire to autonomy for a particular group of people from a dominant political institution as separatist incidents. Therefore terrorist incidents such as the ones in the Basque Area, Kashmir, West Bank/Gaza, Southeastern Turkey, South Thailand, Chechenya, etc., are coded as separatist incidents. In order to make my categorizations clear, I include some examples of terrorist incidents in Table 1.4.

General information on the countries used in estimations and countries with highest number of terrorist incidents are shown in tables 1.15 and 1.18 respectively. Table 1.16 shows the number of terrorist incidents that occurred in different regions in the world.

[7] Only when I present the replication of the Krueger and Laitin(2007) results using MIPT data, I use the US State Department definition of international terrorism for comparison purposes. Robustness checks are done by using the alternative definition of international terrorism as well.

Middle East and Persian Gulf have not only the highest number of international terrorist incidents but also the highest number of separatist and domestic incidents compared with other regions.

To measure economic well-being, I use country-level data on GDP per capita from UN national accounts. Population, growth rates, Gini index of the countries/areas are also taken from UN national accounts. Most of the papers in economic literature use economic data from Penn World Tables or data from the World Bank but these data sets do not include data on conflict regions such as West Bank and Gaza, therefore I prefer to use UN national accounts instead. To measure the (lack of) civil liberties, I use the civil liberties index taken from Freedom House's data set. The civil liberties index runs between 1 and 7, where 7 shows no civil rights. Religion data is taken from CIA factbook, and ethnic, linguistic, and religious fractionalization is taken from Alesina et.al.(2003). Geographical data -distance, common border, common language, and having a colonial link- used in bilateral estimations for international incidents are taken from CEPII (French Research Center in International Economics).

1.3 Empirical Strategy

1.3.1 Cross Section Estimation

In all the estimations the number of terrorist incidents with fatalities is used as the dependent variable. The number of terrorist incidents is an event count, which is the realization of a non-negative integer valued random variable. Therefore, count data estimation techniques are used in the paper. The standard model for count data analysis is the Poisson Regres-

sion Model. Poisson regression is a special type of non-linear regression that considers the non-negativity and discreteness of the data.

Let us assume that the number of terrorist incidents with fatalities is shown by the dependent variable $Terror_i$ in cross-country estimations, where i stands for the country i. The independent variables is shown by the k dimensional vector of covariates, $x_i^{'} \equiv [\log(GDP)_i, Population_i, Lack\ of\ Civil\ Liberties_i, ..., x_{ik}]$, and parameters β. I will use log (GDP) as the independent variable of interest and x vector also includes the variables that can potentially affect terrorism such as lack of civil liberties, population, fractionalization, Gini coefficient, etc. Under Poisson regression, the discrete random variable $Terror_i$ is assumed to be distributed Poisson with intensity parameter $\mu(x_i, \beta)$ where $\mu(x_i, \beta) \equiv E(Terror|x)$. $Terror_i$ given x_i is distributed Poisson with the following density function:

$$f(Terror_i|x_i) = \left[\exp(-\mu_i)\mu_i^{Terror_i}\right] / Terror_i! \tag{1.1}$$

The log-linear version of the model imposes $\mu_i = \exp(x_i'\beta)$, in order to guarantee that μ_i is positive. The Poisson model imposes some restrictions on the conditional moments of $Terror_i$ like the equality of conditional mean and conditional variance (equidispersion):

$$Var(Terror_i|x_i) = E(Terror_i|x_i) = \exp(x_i'\beta) \tag{1.2}$$

Given the independent variables, the Poisson regression model is estimated by maximum likelihood estimation. One important problem with using Poisson regression models is that the equidispersion assumption may be too restrictive. For example, I find that the number

of terrorist incidents in the MIPT data are overdispersed. When there is overdispersion the Poisson estimates are inefficient with standard errors biased downwards, and the computed maximum likelihood Poisson z-statistics overinflated. In order to solve this problem one can use Poisson Quasi-Maximum Likelihood (PQML) estimator with corrected standard errors or Negative Binomial Estimator. Following the previous literature on terrorism, I use Negative Binomial estimations with cross-country regressions. In negative binomial estimations, we relax the variance assumption of Poisson regression model that the variance is equal to mean. Instead the following conditional variance will be used:

$$Var(Terror_i|x_i) = \mu_i + \alpha\mu_i^2$$

where $\mu_i = \exp(x_i'\beta)$ still holds and α is a scalar parameter showing the degree of overdispersion. We can see from this condition that when $\alpha = 0$, we have the same variance condition as Poisson.[8]

The negative binomial distribution is given by

$$f(Terror|\mu,\alpha) = \frac{\Gamma(Terror + \alpha^{-1})}{\Gamma(Terror+1)\Gamma(\alpha^{-1})}\left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu}\right)^{\alpha^{-1}}\left(\frac{\mu}{\alpha^{-1}+\mu}\right)^{Terror} \tag{1.3}$$

where $\alpha > 0$ and $\Gamma(.)$ is the gamma function. This density function is equal to a Poisson density if $\alpha = 0$

Log likelihood function for negative binomial is the following:

[8] We will use NB2 model where $Var(Terror_i|x_i) = \mu_i + \alpha\mu_i^2$. Alternatively, NB1 variance function is $Var(Terror_i|x_i) = \mu_i + \alpha\mu_i$

$$\mathcal{L}^{NB}(\alpha,\beta) = \sum_{i=1}^{n}\{\left(\sum_{j=0}^{Terror-1}\ln(j+\alpha^{-1})\right) - \ln Terror_i! - (Terror+\alpha^{-1})$$
$$\ln(1+\alpha\exp(x_i'\beta)) + Terror_i\ln\alpha + Terror_i x_i'\beta\} \tag{1.4}$$

Therefore $\hat{\alpha}_{NB}$ and $\hat{\beta}_{NB}$ are the solution of the first order conditions listed below:

$$\sum_{i=1}^{n}\frac{Terror_i-\mu_i}{1+\alpha\mu_i}x_i = 0 \tag{1.5}$$

$$\sum_{i=1}^{n}\left[\left(\frac{1}{\alpha^2}\ln(1+\alpha\mu_i) - \sum_{j=0}^{Terror-1}\frac{1}{(j+\alpha^{-1})}\right) + \frac{Terror_i-\mu_i}{\alpha(1+\alpha\mu_i)}\right] = 0 \tag{1.6}$$

1.3.2 Panel Data Estimations

As far as I know, this is the first paper performing panel data estimations in economics literature using targets and origins of terrorism.[9] A very important advantage of using longitudinal data over cross-section data is that they allow for more general types of heterogeneity (Cameron and Trivedi, 1998). In terrorism setting I estimate the impact of economic well-being on the number of significant terrorist incidents in a country, controlling for country specific propensity to be the target or perpetrator of a terrorist incident. In a cross section setting these controls can only depend on country specific characters like civil liberties, but in a panel data setting I include country-specific fixed effects that might include unobserved country-specific propensity to be involved in a terrorist incident.

[9]Dreher and Gassebner (2008) performs panel data estimations but the authors focus on the country of occurence but not the target or origins of terrorism. Using negative binomial fixed effects estimations and they find that economic conditions are unrelated with terrorism.

Panel data estimations are performed by using fixed effects Poisson Quasi Maximum Likelihood estimation. Estimations are done by using the number of terrorist incidents in country i and year/period t as the dependent variable following the pioneering work of Hausman et. al. (1984).

Recent literature has highlighted some problems of using negative binomial estimations in longitudinal data setting. Allison and Waterman (2002) argue that the negative binomial fixed effects estimations proposed by Hausman et. al. (1984) is not a true fixed effects model. Authors find that negative binomial fixed effects estimations do not provide any additional leverage for dealing with overdispersion. Guimaraes (2008) confirms the findings of Allison and Waterman (2002) and shows that NB fixed effects model does not necessarily remove the individual fixed effects in count data using a score test. Cameron and Trivedi (1998) show that panel data estimations for count data are most easily done by Poisson estimations and extensions to the negative binomial do not always work. Panel data methods already control for individual heterogeneity and Poisson Quasi Maximum Likelihood(PQML) panel data models with corrected standard errors may be sufficient to treat the overdispersion as we do not include any assumption about conditional variance and conditional mean.

The regular Poisson Fixed Effects Model is given by:

$$Terror_{it} \tilde{} Poisson[\mu_{it} = \gamma_i \lambda_{it}]$$

$$\lambda_{it} = \exp(x_{it}^{'}\beta) \qquad i = 1, ..., n \quad t = 1, ..., T$$

where γ shows the country-specific unobserved parameters. The key difference in count

data estimations from regular linear fixed effects estimations is that the individual specific effects are multiplicative not linear. As a result of the exponential form of λ_{it}, I can still interpret the multiplicative effects as a shift in intercept because:

$$E[Terror_{it}|x_{it},\gamma_i] = \mu_{it} = \gamma_i \exp(x_{it}^{'}\beta)$$

$$E[Terror_{it}|x_{it},\gamma_i] = \exp(\delta_i + x_{it}^{'}\beta)$$

where $\delta_i = \ln \gamma_i$

Poisson ML fixed effects estimator $\hat{\beta}_{FE}^{P}$ maximizes the log likelihood function:

$$\mathcal{L}^{NB}(\beta) = \sum_{i=1}^{n} \ln \left(\sum_{t=1}^{T_i} Terror_{it} \right) ! - \sum_{t=1}^{T_i} \ln \left(Terror_{it}! \right) + \sum_{t=1}^{T_i} Terror_{it} \ln \left(\frac{\exp(x_{it}^{'}\beta)}{\sum_{r=1}^{T_i} \exp(x_{ir}^{'}\beta)} \right) \tag{1.7}$$

The assumption of Poisson distribution is stronger than necessary for statistical inference of β. Therefore I will use Poisson Quasi-Maximum Likelihood (PQML) estimator that will maximize equation (1.7) but is not necessarily distributed Poisson. This relaxes the equidispersion assumption. PQML estimator has strong robustness properties for estimating parameters. Wooldridge (1997, 2002) argues that PQML has an advantage over NB in estimating because of its robustness. Except for the conditional mean, the distribution of $Terror_{it}$ given (x_i, α_i) is entirely unrestricted that there can be overdispersion as well as underdispersion. Therefore, I include only the PQML estimation results for panel data

estimations.

1.4 Empirical Results

1.4.1 International Terrorism

In this section, I perform panel data as well as cross-country estimations for targets and origins of terrorism controlling for several determinants of international terrorism. First, following the previous literature, I show the cross-country estimation results, and then I will present the panel data estimation results.

The first and only paper that performs analysis of the targets and origins of international terrorism is Krueger and Laitin (2007). The authors estimate cross-country regressions using US State Department data on the number of significant international terrorist incidents in each country between 1997-2002. For comparison purposes I replicate the Krueger and Laitin (2007) estimations using MIPT data for the very same time period, explanatory variables, and the same definition for international terrorism.

Table 1.5 presents a comparison of the Krueger and Laitin (2007) estimation results and my results using the MIPT data set. Generally, the estimation results using MIPT are very similar to Krueger and Laitin (2007). When I use the MIPT data I find that perpetrators come from low GDP countries, but when I control for civil liberties and religion the effect of GDP disappears. It appears that once I control for lack of civil liberties and religion economic conditions are important only for targets but not for perpetrators. Following Krueger and Laitin (2007), I also find that terrorists originate from countries with low civil liberties. Another finding is that international terrorist incidents not only occur in highly

populated countries, but also target and originate from countries with significantly higher population. In terms of religion, in contrast to Krueger and Laitin (2007), I find that international terrorist incidents occur significantly more in Muslim countries.

As I have mentioned earlier, one advantage of the MIPT data over the US State Department data set is that it is more up to date. Therefore, I repeat similar cross country estimations using MIPT data from 1998 to 2006. The data between 1998 to 2006 is used because MIPT data started to collect data in domestic and separatist incidents in 1998. I believe that the data is more reliable after 1998 and I can compare the international terrorism results with domestic and separatist terrorism after this year. Table 1.6 shows the negative binomial estimation results for International Terrorist Incidents between 1998 and 2006. The first three columns show the negative binomial estimation results using the number of significant terrorist incidents that occur in a given country as the dependent variable. Columns (3) and (4) in Table 1.6 shows the estimation results using as the dependent variable the number of international incidents that target in a given country. Last two columns in Table 1.6 shows the estimation results using the number of international terrorist incidents that originate from a given country as the dependent variable.

Following Krueger and Laitin (2007), I use lack of civil liberties and lack of civil liberties squared as independent variables. The same estimations are done with the lack of political liberties and political liberties squared, as the results do not differ much, I will only show the results using lack of civil liberties. Log GDP per capita is used as the independent variable of interest. Following Krueger and Laitin (2007), I also use population, religion, and lagged average growth rates from 1990-1997 as other controls. Like Abadie (2004), I use ethnic, linguistic and religious fractionalization as other independent variables. Table

1.6 reports that, in line with previous literature, richer countries are the main targets of international terrorist incidents, but international incidents have no economic roots. I also find that the targets of terrorism, just like the perpetrators' countries of origin, are the countries in the middle range of civil liberties, rather than the countries with low or high civil liberties. Abadie (2004) found similar results for political rights.

Another finding is that countries with a higher proportion of Muslims have higher levels of international terrorism within their borders and are targeted significantly more compared to countries with a higher proportion of Christians. Higher ethnic fractionalization seems to impact whether one turns to terrorism or not. There is a negative and significant effect of ethnic fractionalization on the number of international terrorist incidents originating from that country. If the terrorist comes from an ethnically diverse country, he might experience the ethnic differences within the countries they already grow up and this might decrease the violence against people with different ethnic backgrounds by increasing tolerance towards people. This might result in a decrease in the number of international terrorist incidents that are usually directed at people from a different ethnic background than the terrorist. Alternatively, one can think that ethnically fragmented countries are busy terrorizing among domestic nationals and thus do not consider attacking foreign nationals.

As an alternative way of estimation following the relevant international trade literature, I use bilateral estimations for international incidents where the targets of terrorist incidents and its origins are grouped together. Bilateral estimation results for international terrorist incidents between 1998 and 2006 are listed in Table 1.7. Similar estimations using US State Department data set can be seen in Krueger (2007). Blomberg and Hess (2005) also does similar bilateral estimations for international terrorism using ITERATE data set.

The dependent variable used in bilateral estimations is the number of terrorist incidents targeting country i and originating in country j at time t. Using the paired data has its own advantages. I can control for some geographical variables such as countries having a common border, one being the former colony of the other and the distance between the attacker and the victim of the attack. [10]

In estimation (1) in Table 1.7, it can be seen that terrorists originate from poorer countries and tend to target richer countries, yet once we control for civil liberties the significant relation disappears. I also find that the number of international terrorist incidents falls when the distance between the target and perpetrator increases. As the distance might raise the cost of terrorist activity this result is quite intuitive. I also find that having a common border and having a colonial link in history increases the number of incidents.

Following Krueger (2007), when I use the absolute economic conditions of the perpetrator's country of origin and target's country I find that terrorist attacks targeting a given country is an increasing function of that country's per capita GDP but is unrelated with the GDP per capita levels of the terrorist's country of origin. Terrorists that engage in international terrorism significantly originate from countries with medium civil liberties. I can not find any robust effect of the target's civil liberties. Surprisingly, perpetrator's lagged GDP growth has a positive and significant effect on the number of terrorist incidents. I find that religion of the perpetrator's country is important as well. Terrorists originating from Muslim countries tend to engage in more international terrorist incidents compared to their

[10] Rather than the regular control variables I used in the previous cross country estimations, I also control for the target having a different religion from the terrorist's country of origin. I furthermore control whether the target has ever occupied the terrorist's country of origin before in history in line with Krueger (2007). The results are found to be similar, therefore I do not list the results.

Christian counterparts.

Panel Data Estimation Results

As mentioned earlier one of the contributions of this paper is that I can employ panel data estimation techniques as the MIPT data set goes much further back in time. I employ Poisson Quasi-Maximum (PQML) fixed effects estimations because of its robustness properties.

It may be argued that terrorism is affected by longer term changes in GDP levels but not year to year changes in GDP levels. I believe that this is a reasonable argument for panel data estimations. I generate a five-year period data for international terrorist incidents between 1972 to 2006 and perform PQML fixed effects estimations with five-year period data. In contrast to cross country estimation results and results in previous literature Table 1.8 shows that poverty is a significant source of international terrorism. I find that the citizens are more likely to engage in international terrorism in countries whose economic situation worsens In contrast to the cross-section estimation results, I find that improvement of economic well-being within a country doesn't increase the probability of being the target of an international terrorist incidents. These results for international terrorism holds for yearly panel data estimations from 1998-2006 as well as 1972-2006. These results can be seen in Tables 1.9 and 1.10, respectively.

Therefore, the panel data fixed effects estimation results for international terrorist incidents are quite different from cross-country estimation results. As I mentioned earlier, following the previous literature I do not find any significant relation between economic development and terrorism in cross section estimations. When I control for country-specific

fixed effects, however, I find that countries that become richer over time export less terrorism/terrorists. Additionally in contrast to the cross country results, I find that, countries that grow richer over time do not attract more terrorist attacks. These differences between cross section and panel data results suggest the importance of controlling for country-specific omitted variables by using panel data fixed effects estimations in terrorism setting.

1.4.2 Domestic and Separatist Terrorism

According to MIPT data set, more than 50% of all terrorist incidents between 1998 and 2006 are domestic in nature. Therefore, a comprehensive investigation of the nature of terrorism must also include a study of determinants of domestic terrorism. This suggests the importance of finding the determinants of domestic terrorism. Estimation results for domestic terrorist incidents using cross-country data are similar to the findings of Feldman and Ruffle (2008). Table 1.11 shows the cross-country estimation results using negative binomial estimations. As the country of occurrence, target's country and terrorist's country of origin is the same for domestic incidents, I do not use separate estimations here. Results in the first column show that domestic incidents occur in poorer and crowded countries. Once I control for civil rights, religion, and growth I find that economics does not play a significant role. Domestic terrorism occurs in countries with medium level of civil liberties. Another important economic variable that is important for domestic terrorism is the Gini coefficient and urban population but I cannot find any link between income inequality and urbanization and domestic terrorism in negative binomial estimations. Surprisingly, Poisson Quasi Maximum Likelihood estimations suggest a different result. I find a positive and significant link between Gini coefficient and domestic terrorism. This result can be seen

in Table 1.11 column (4). Therefore, more income inequality might suggest higher domestic terrorist attacks, depending on the specification.

The Poisson QML fixed effects estimations for domestic incidents are shown in Table 1.12. I find that number of domestic terrorist incidents decreases with increases in economic well-being. Just as in the cross-section estimation results, I find that domestic terrorism is highest in countries with medium level civil liberties. Panel data estimations in Table 1.12 are performed for domestic terrorism for a shorter period of time (1998-2006) compared to panel data estimations for international terrorism (1972-2006). Lack of availability of domestic terrorism data for a long period, makes it impossible to perform five-year period panel data estimations. I can only perform panel data estimations using the number of incidents in each country in each year[11].

Using negative binomial cross country estimations, Table 1.13 shows that the countries that suffer from separatist terrorist incidents are significantly richer when I control for ethnic, religious, and linguistic fractionalization. Column (3) in Table 1.13 also indicates that the targets of terrorist incidents are significantly high population countries with high linguistic fractionalization but low growth rates and medium level civil liberties. It also shows that religion is significantly important for separatist incidents. Although the results given in Table 1.13 are interesting, we don't use any information on the economic conditions of separatist regions in these estimations.

In order to find the economic origins of separatist terrorism, we need to know the eco-

[11]It might be argued that changes in economic well-being within countries are important in a longer term than one year. For this reason yearly panel data might not be as informative as five-year period data. Therefore, the results listed for domestic terrorist incidents may not be as suggestive as international terrorist incidents.

nomic conditions in separatist regions. I generate an entirely new data set with regional GDP of separatist regions, which allows me to look at the determinants of separatist terrorism. It is difficult to come up with precise data for separatist areas GDP per capita levels. I tried to overcome these difficulties about the data as much as I could and come up with approximations on GDP levels by setting some rules. If a specified separatist terrorist group is responsible for the attack, then the area(s) for which the terrorist group demands autonomy is identified as the separatist region. If the terrorist group is not known, the separatist region is identified as the region where most of the terrorist incidents take place. For example, when we look at the separatist incidents in southeastern Turkey, the terrorist group PKK (Kurdistan Workers Party) demands independence of certain cities in southeastern Turkey. These are also the cities that are highly affected by separatist terrorism. These cities include Adıyaman, Bingöl, Bitlis, Diyarbakir, Elazığ, Hakkari, Mardin, Muş, Tunceli, Van, Siirt, Batman and Şırnak in Turkey. I generate an average GDP level for the cities for the GDP level of the separatist region. Data set on the GDP per capita levels for these cities are taken from Turkish State Institute of Statistics. Likewise, data for other areas in which separatist terrorist incidents take place are gathered from different sources for each separatist area, including Eurostat, UN Human Development Reports, Central Banks and State Institutes of Statistics of relevant countries.

Table 1.14 lists the bilateral negative binomial estimation results for the separatist areas. The dependent variable is the number of separatist incidents originating from the separatist area i from country j. In these estimations the target is the mainland and the terrorist's origin is the separatist region/area. In Turkey, for example, mainland's GDP stands for entire GDP of Turkey, and GDP of the separatist area stands for the GDP level in Southeastern

Turkey. The results suggests that separatist terrorism is significantly higher in poor areas. I find that the higher the relative GDP (GDP of the mainland/GDP of the separatist area), the higher is the number of separatist incidents in the separatist area. The Gini coefficient also plays an important role here. The higher the income inequality, the higher will be the number of separatist incidents. I also find that number of separatist incidents in separatist areas increase with the central government's ethnic and linguistic fractionalization. Civil liberties are shown to explain separatist terrorism, but like international and domestic incidents, it does so in a non-monotonic way. Countries with moderate civil liberties tend to be the targets of separatist incidents.[12] Unfortunately, it is not possible to come up with panel data results in separatist terrorism. Although it is possible to generate GDP levels for different years in separatist regions of some countries, such as Turkey, India, Thailand, Israel, and Spain the data is quite limited in other countries. As a future work, a case study using yearly data on development in a specific separatist region, as well as the number of separatist incidents, can be done to gain more insight about separatist terrorism and its economic roots.

1.5 Conclusion

In order to fight against terrorism, it is important to understand its root causes. In this paper, I question whether changes in economic conditions have a significant effect on international, domestic, and separatist terrorism. Empirical results in the previous literature suggest that economic conditions are mostly unrelated to terrorism. I argue that these

[12] The main problem with these estimations, in Table 1.14, is the low degrees of freedom. I specify only 30 areas in the world that are the perpetrator's origin for separatist terrorist incidents.

results may not be as robust as we thought, and some of the data I use suggest that low levels of development do lead to terrorism. Using a more up-to-date, and arguably better, panel data set on international terrorism, I find that countries that get richer over time export fewer international terrorism and do not attract more terrorist attacks from abroad. Similarly, I find that when a country is richer over time, the country's nationals commit fewer terrorist attacks at home. I build an entirely new data set with regional GDP of separatist regions and find that the higher the GDP of the separatist region, the fewer will be terrorist attacks committed by native separatists.

Empirical findings in this paper suggest that the policy makers should be more cautious in ruling out the effect of economics on terrorism. My findings show that economic policies can be used to fight against terrorism in specific settings. The findings of separatist terrorism suggest that it is important to consider the causes of separatist terrorism different from domestic and international terrorism. The economic roots of separatist terrorism can be understood more fully through country-specific studies, which I leave for a future work.

Table 1.1: Description of the Variables

Variables	Description
International Incidents Occurred	Total number of international terrorist incidents with fatalities occurred in the country/ area.
Domestic Incidents Occurred	Total number of incidents perpetrated by local nationals against a purely domestic target.
Separatist Incidents Occurred	Total number of separatist Incidents occurred in the country/ area.
International Incidents Occurred	Total number of international terrorist incidents that target the country/ area.
International Incidents Made	Total number of international incidents that the country/ area is the country of origin of the perpetrator/ terrorist.
Separatist Incidents Made	Total number of separatist incidents that the area is the country of origin of the perpetrator/ terrorist.
Bilateral International Incidents	Total number of international terrorist incidents with fatalities for a given pair of target and perpetrator's country. (Used in Bilateral Estimations)
	Source: Author's categorizations and calculations from MIPT data set
Log GDP per capita	Log of nominal GDP per capita(averaged lagged value) (Kruger replicate estimations 1997-2001, Cross Section estimations 1998-2005, Panel Data Estimations lagged value)
Log Relative GDP per capita	Log (Target's GDP per capita/ Perpetrator's GDP per capita)
Log Population	Log of Population
Growth	Growth rate of GDP per capita (averaged lagged value). (Kruger replicate estimations 1990-2000, Cross Section estimations 1990-1997, Panel Data Estimations lagged value)
Gini Index	Gini Index on income. Range between 0 and 100. 100 shows perfect inequality.
	Source: UN National Accounts
Lack of Civil Liberties	Lack of Civil Liberties shown by an index number between 1 and 7. 7 shows no civil liberties.
Lack of Civil Squared	Squared value of lack of civil liberties. ***Source: Freedom House***
Muslim	Proportion of Muslim living in the country/area.
Buddhist	Proportion of Buddhist living in the country/area.
Hindu	Proportion of Hindu living in the country/area.
Others	Proportion of people who are not Christian, Muslim, Buddhist or Hindu living in the country/area.
	Source: CIA World Factbook
Ethnic	Ethnic Fractionalization
Linguistic	Linguistic Fractionalization
Religious	Religious Fractionalization
	Index number between 0 and 1. Shows the probability of two individuals chosen randomly from same country belong a different ethnic/ linguistic/ religious group.
	Source: Alesina et.al. 2003
Distance	Bilateral distances between the biggest cities of those countries
Common Border	Dummy variable indicating whether the two countries are contiguous
Common Language	Dummy variable indicating whether the two countries share a common language
Colony	Dummy variable indicating whether the two countries have ever had a colonial link
	Source: French Research Center in International Economics (CEPII)
Occupied	Dummy variable equals to 1 if the country is occupied by any other country in the world
Occupier	Dummy variable equals to 1 if the target country occupied by any other country in the world
	Source: Krueger(2007)

Table 1.2: Summary Statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Terrorism:					
International Attacks Occurred	158	3.22	19.92	0	265
Domestic Attacks Occurred	158	33.94	328.18	0	4574
Separatist Attacks Occurred	158	10.88	60.87	0	700
International Attacks Received	158	3.22	13.12	0	155
International Attacks Made	158	3.22	20.72	0	269
Separatist Attacks Made	32	64.44	146.48	0	704
Civil Liberties:					
Lack of Civil Liberties	155	3.51	1.77	1	7
Population(millions)	154	39.2	136	0.003149	1280
Economic Variables:					
GDP per capita	155	7192.67	11140.79	103.5	57019.5
Growth	156	2.28	4.44	-14.47	14.29
Gini	123	40.00	9.90	24.00	70.70
Fractionalization:					
Ethnic	151	0.46	0.25	0	0.93
Linguistic	147	0.39	0.28	0	0.92
Religious	152	0.43	0.24	0	0.86
Religion:					
Christian	150	0.55	0.39	0	1
Muslim	151	0.24	0.36	0	1
Buddhist	151	0.05	0.19	0	0.96
Hindu	150	0.03	0.13	0	0.87
Others	151	0.14	0.20	0	1

Summary statistics for variables used in cross country estimations between 1998 and 2006 are shown.
Note: All terrorist incidents show the number of incidents with fatalities

Table 1.3: Data Categorization Rules

Country of Occurrence	Already given in the data base.
Target Country	1) Country that is the main target of the incident (gathered from the incident short summary). 2) If the main target is not known, it is assumed to be the country with highest number of fatalities. 3) If there is ambiguity on the target is set as unknown.
Perpetrator's Country	1) Country that is the terrorist's country of origin. 2) If perpetrator's country not known it is assumed to be the terrorist's group base country. 3) If the terrorist group responsible from the attack is not know, it is set as the country of occurrence.
International Incidents	Terrorist attack where the target's country is different from perpetrator's country of origin Alternative definition: Terrorist attack involving citizens or the territory of more than one country. (Alternative Definition is used only for the results in Krueger et.al.. (2007) replicate estimations for comparison purposes)
Domestic Incidents	Terrorist incidents where the target's country, perpetrator's country and the country of occurrence are the same. (We exclude separatist incidents even though the official citizenship of the target, perpetrator are the same in most of the cases)
Separatist Incidents	Terrorist incidents by separatist movements that aspire to autonomy for a particular group of people from a dominant political institution.

Table 1.4: Examples on Terrorist Incident Categorization

Description of the event	*Country Of Occurrence*	*Target's Country*	*Perpetrator's Country/ Area*	*Incident Type*
1) "TANZANIA. A suicide car bomb exploded outside the U.S. Embassy in Dar es Salaam. The attack coincides with another suicide attack on the US Embassy in Kenya. The blast killed at least eleven individuals and injured seventy-seven others. No Americans were killed in the attack, and it is unclear how many were injured. Osama Bin Laden's group Al-Qaeda has claimed responsibility for the blast.	Tanzania	United States	Afghanistan	International
2) "SPAIN. An ETA bomb was found and defused at the Delfin Park Hotel in Salou. All guests were safely evacuated."	Spain	Spain	Basque Region	Separatist
3) "PERU, An explosive device detonated in downtown Peru near the National Election Board. Officials are attributing the explosion to a leftist guerrilla group, possibly the Shining Path (SL).	Peru	Peru	Peru	Domestic

Table 1.5: NB Results for International Terrorist Incidents in comparison to Krueger and Laitin(2007)

Negative Binomial Cross Section Estimation Results for International Terrorist Incidents, MIPT versus Krueger and Laitin (2007) Results

Dependent Variable: Number of significant international terrorist incidents in each country between 1997-2002

	MIPT						Krueger and Laitin (2007) estimations					
Explanatory Variables	Occurrence		Target		Perpetrator		Occurrence		Target		Perpetrator	
	(1)	(2)	(3)	(4)	(5)	(6)	(1')	(2')	(3')	(4')	(5')	(6')
Log GDP per capita	-0.13*	0.19*	0.31***	0.5***	-0.3**	0.04	-0.13*	0.12	0.31***	0.43***	-0.17	0.23
	(0.11)	(0.13)	(0.09)	(0.13)	(0.12)	(0.17)	(0.11)	(0.19)	(0.08)	(0.14)	(0.12)	(0.20)
Log Population	0.54***	0.67***	0.75***	0.75***	0.53***	0.62***	0.64***	0.7**	0.76***	0.73***	0.74***	0.94***
	(0.13)	(0.11)	(0.10)	(0.12)	(0.13)	(0.12)	(0.12)	(0.14)	(0.08)	(0.10)	(0.16)	(0.17)
GDP Growth		-0.02		-0.06		-0.02		-0.05		-0.44		-0.42
		(0.06)		(0.06)		(0.06)		(0.68)		(0.58)		(0.72)
Lack of Civil Liberties		0.42***		0.22		0.46***		0.5**		0.17		0.8**
		(0.12)		(0.11)		(0.14)		(0.25)		(0.16)		(0.27)
Proportion Muslim		1.11		0.72*		0.67		-0.52		-0.45		-0.35
		(0.46)*		(0.53)		(0.55)		(0.70)		(0.50)		(0.76)
Proportion Buddhist		0.37		0.69		0.03		1.42		-1.11		-1.25
		(0.74)		(0.90)		(0.72)		(1.02)		(0.83)		(1.16)
Proportion Hindu		-1.2		0.85		-0.82		0.25		1.34		0.32
		(1.03)		(0.72)		(0.94)		(1.36)		(0.98)		(1.59)
Proportion of Other		1.04		1.36*		-1.03		0.87		0.88*		1.52**
		(1.19)		(1.14)		(1.83)		(0.90)		(0.67)		(0.91)
Constant	-7.96***	-14.65***	-15.04***	-17.89***	-6.71***	-12.41***	-8.28***	-13.03***	-13.97***	-14.98***	-9.65***	-19.39***
	(2.39)	(2.35)	(1.89)	(2.77)	(2.52)	(2.88)	(2.27)	(3.01)	(1.56)	(2.08)	(2.83)	(3.72)
Sample Size	150	138	150	138	150	138	150	138	150	138	150	138
Pseudo R-squared	0.06	0.11	0.17	0.18	0.07	0.16	0.05	0.07	0.13	0.14	0.05	0.09

Standard errors in parentheses

* significant at 10%, ** significant at 5%; ***significant at 1%

Table 1.6: NB Results for International Terrorist Incidents

Negative Binomial Cross Section Estimation Results for International Terrorist Incidents

Dependent Variable: Number of significant [1] international incidents in each country (1998-2006)

Explanatory Variables	Country of Occurrence		Target's Country		Perpetrator's Country of Origin	
	(1)	(2)	(3)	(4)	(5)	(6)
Log GDP per capita	-0.23	0.45***	0.35***	0.82***	-0.33	0.31**
	(0.19)	(0.13)	(0.10)	(0.16)	(0.23)	(0.14)
Log Population	0.78***	0.91***	0.70***	0.79***	0.78***	0.88***
	(0.20)	(0.14)	(0.11)	(0.11)	(0.23)	(0.17)
Growth		0.01		-0.02		0.00
		(0.04)		(0.05)		(0.03)
Lack of Civil Liberties		2.08***		1.13**		2.90***
		(0.49)		(0.46)		(0.63)
Lack of Civil Squared		-0.15***		-0.10*		-0.23***
		(0.06)		(0.05)		(0.07)
Muslim		1.27**		1.30***		0.76
		(0.59)		(0.50)		(0.64)
Buddhist		-1.33		-0.50		-1.44
		(1.11)		(0.92)		(0.97)
Hindu		-1.99*		1.51		-0.10
		(1.04)		(1.66)		(1.18)
Others		-0.02		-0.26		-1.17
		(1.25)		(1.02)		(1.85)
Ethnic		-1.66**		-0.31		-2.24**
		(0.78)		(0.70)		(0.94)
Linguistic		0.23		0.04		0.14
		(0.69)		(0.67)		(0.80)
Religious		-0.27		0.49		-0.47
		(0.79)		(0.74)		(0.91)
Constant	-10.02***	-22.92***	-13.63***	-21.72***	-9.40**	-22.74***
	(3.11)	(3.37)	(2.03)	(2.89)	(3.92)	(4.08)
Observations	138	138	138	138	138	138
Pseudo R-squared	0.05	0.20	0.12	0.16	0.06	0.22

[1] incidents with fatalities

Standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

Table 1.7: Bilateral NB Estimation Results

Bilateral Negative Binomial Cross Section Estimations for International Incidents

Dependent Variable: Number of significant [1] international terrorist incidents for a given pair of target's country and perpetrator's country of origin (1998-2006)

Explanatory Variables	(1)	(2)	(3)	(4)
Perpetrator's Variables:				
Log GDP per capita	-0.47***	-0.01	-0.05	
	(0.08)	(0.07)	(0.10)	
Growth			0.03	0.06**
			(0.02)	(0.02)
Log Population	0.6***	0.64***	0.66***	0.63***
	(0.07)	(0.07)	(0.08)	(0.09)
Lack of Civil Liberties		0.86***	1.67***	1.30***
		(0.08)	(0.35)	(0.33)
Lack of Civil Squared			-0.11**	-0.07**
			(0.04)	(0.04)
Religion			Yes	Yes
Fractionalization			Yes	Yes
Target's Variables:				
Log GDP per capita	0.62***	0.63***	0.51***	0.03*
	(0.09)	(0.10)	(0.09)	(0.02)
Growth			0.03*	0.88***
			(0.02)	(0.12)
Log Population	0.95***	0.94***	0.89**	-0.76**
	(0.15)	(0.13)	(0.12)	(0.32)
Lack of Civil Liberties		0.05	-0.3	0.08
		(0.07)	(0.33)	(0.04)*
Lack of Civil Squared			0.04	
			(0.04)	
Other Variables				
Log Relative GDP [2]				0.30***
				(0.06)
Distance	-0.33***	-0.29***	-0.21***	-0.21***
	(0.07)	(0.06)	(0.06)	(0.06)
Common Border			1.92***	1.89***
			(0.42)	(0.41)
Common Language			0.37*	0.4*
			(0.28)	(0.28)
Colony			0.92**	0.97**
			(0.40)	(0.41)
Constant	-30.15***	-38.63***	-37.82***	-31.62***
	(3.35)	(3.29)	(3.24)	(2.79)
Number of Observations	23104	23104	20976	20976
Pseudo R-Squared	0.18	0.24	0.29	0.28

[1] incidents with fatalities

[2] Relative GDP per capita =GDP per capita of target/ GDP per capita of perpetrator

Standard errors in parentheses

* significant at 10%, ** significant at 5%; ***significant at 1%

Table 1.8: Panel Data Poisson QML Fixed Effects Results, Five-Year

Panel Data Poisson QML FE Estimations for International Terrorist Incidents (Five-year)

Dependent Variable: Five-year period number of significant[1] international incidents in each country between 1972 and 2006

Explanatory Variables	Country of Occurrence		Target Country		Perpetrator's Country	
	(1)	(2)	(3)	(4)	(5)	(6)
Log GDP per capita	-0.88***	-0.84***	0.18	0.12	-0.75**	-0.74***
	(0.23)	(0.23)	(0.26)	(0.24)	(0.30)	(0.27)
Log Population	2.52***	2.56***	0.31	0.15	1.60*	1.60*
	(0.83)	(0.88)	(0.63)	(0.64)	(1.12)	(1.22)
Lack of Civil Liberties		-0.31		0.61**		0.86
		(0.38)		(0.28)		(0.50)
Lack of Civil Squared		-0.02		-0.08**		-0.08*
		(0.05)		(0.04)		(0.06)
GDP Growth		0.00		0.00		-0.02
		(0.01)		(0.01)		(0.02)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	778	773	736	726	697	693
Number of Countries	116	116	113	112	104	104

[1] *incidents with fatalities*

Standard errors in parentheses

* significant at 10%, ** significant at 5%; ***significant at 1%

Table 1.9: Panel Data Poisson QML Fixed Effects Results, 1998-2006

Panel Data Poisson QML FE Estimations for International Terrorist Incidents(1998-2006)

Dependent Variable: Number of significant[1] international terrorist incidents in each country each year

Explanatory Variables	Country of Occurrence		Target Country		Perpetrator's Country	
	(1)	(2)	(3)	(4)	(5)	(6)
Log GDP per capita	-1.4*	-1.00	0.15	-0.2	-1.62**	-1.45***
	(0.82)	(0.72)	(1.16)	(0.87)	(0.78)	(0.20)
Log Population	0.48	1.74	1.23	2.1	5.18	5.76*
	(5.98)	(5.95)	(5.03)	(4.66)	(5.55)	(3.01)
Lack of Civil Liberties		-0.1		-0.82		0.65
		(0.88)		(0.75)		(0.38)
Lack of Civil Squared		0.11		0.07		0.04
		(0.10)		(0.09)		(0.04)
GDP Growth		-0.02		0.01		0.03***
		(0.03)		(0.03)		(0.01)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	558	466	630	520	426	426
Number of Countries	62	59	70	65	54	54

[1] *incidents with fatalities*

Standard errors in parentheses

* significant at 10%, ** significant at 5%; ***significant at 1%

Table 1.10: Panel Data Poisson QML Fixed Effects Results, 1972-2006

Panel Data Poisson QML FE Results for International Terrorist Incidents (1972-2006)						
Dependent Variable: Number of significant [1] international incidents in each country between 1972-2006						
Explanatory Variables	Country of Occurrence		Target Country		Perpetrator's Country	
	(1)	(2)	(3)	(4)	(5)	(6)
Log GDP per capita	-0.73***	-0.69***	0.26	0.25	-0.65***	-0.6**
	(0.19)	(0.21)	(0.23)	(0.22)	(0.25)	(0.26)
Log Population	2.51***	2.63***	0.32	0.33	1.54	1.69
	(0.81)	(0.85)	(0.61)	(0.61)	(1.13)	(1.23)
Lack of Civil Liberties		0.05		0.38		0.43
		(0.36)		(0.20)		(0.46)
Lack of Civil Squared		0.01		-0.06**		-0.02
		(0.04)		(0.02)		(0.05)
GDP Growth		0.00		0.00		0.00
		0.00		0.00		(0.01)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3739	3694	3511	3432	3333	3295
Number of Countries	116	116	113	111	103	103

[1] *incidents with fatalities*

Standard errors in parentheses

* significant at 10%, ** significant at 5%; ***significant at 1%

Table 1.11: Cross Section Estimation Results for Domestic Terrorist Incidents

Dependent Variable: Number of significant domestic terrorist incidents in each country between 1998-2006				
Explanatory Variables	NB	NB	NB	PQML
	(1)	(2)	(3)	(4)
Log GDP per capita	-0.55***	0.47	0.52*	-0.41
	(0.12)	(0.31)	(0.31)	(0.61)
Gini	0.04	0.01	0.01	0.14***
	(0.03)	(0.03)	(0.03)	(0.05)
Log Population	0.97***	0.82***	0.82***	1.67***
	(0.17)	(0.15)	(0.15)	(0.36)
Growth		-0.02	-0.03	-0.18**
		(0.04)	(0.04)	(0.08)
Lack of Civil Liberties		3.87***	3.92***	7.42***
		(0.96)	(0.92)	(2.44)
Lack of Civil Squared		-0.43***	0.44***	-0.78***
		(0.10)	(0.10)	(0.26)
Muslim		0.1	0.06	-0.79
		(1.13)	(1.13)	(0.83)
Buddhist		-0.1	-0.15	-0.70
		(0.87)	(0.93)	(0.91)
Hindu		1.57	1.51	-1.51
		(1.11)	(1.19)	(1.54)
Others		-2.57**	-2.63**	-7.83*
		(1.29)	(1.26)	(4.76)
Ethnic		-0.18	-0.15	1.22
		(1.19)	(1.20)	(2.01)
Linguistic		-0.06	-0.06	-0.20
		(0.94)	(0.94)	(1.62)
Religious		-1.38	-1.39	-4.64***
		(1.30)	(1.32)	(1.57)
Urban Population			0.00	-0.04
			(0.02)	(0.03)
Constant	-11.67***	-22.61***	-22.9***	-47.39***
	(3.33)	(4.83)	(4.55)	(12.15)
Observations	109	109	109	109

Standard errors in parentheses
* significant at 10%, ** significant at 5%; ***significant at 1%
NB stands for Negative Binomial Estimations
PQML stands for Poisson Quasi Maximum Likelihood Estimations

Table 1.12: Panel Data Fixed Effects Results for Domestic Terrorist Incidents

Dependent Variable: Number of significant [1] domestic terrorist incidents in each country each year between 1998-2006		
	Country of Occurrence	
Explanatory Variables	(1)	(2)
Log GDP per capita	-0.43***	-1.21***
	(0.16)	(0.24)
Log Population	6.76***	1.46
	(0.78)	(1.95)
Lack of Civil Liberties		1.84***
		(0.50)
Lack of Civil Squared		-0.12**
		(0.06)
GDP Growth		0.03***
		(0.01)
Year Dummies	Yes	Yes
Observations	514	514
Number of Countries	65	65

[1] *incidents with fatalities*

Standard errors in parentheses

* significant at 10%, ** significant at 5%; ***significant at 1%

Table 1.13: NB Cross Section Results for Separatist Terrorist Incidents

Dependent Variable: Number of significant [1] separatist terrorist incidents in each country (1998-2006)			
Explanatory Variables	*Country of Occurrence/ Target Country*		
	(1)	(2)	(3)
Log GDP per capita	0.51	0.66**	2.30***
	(0.37)	(0.32)	(0.53)
Log Population	1.18***	3.15***	2.48***
	(0.39)	(0.58)	(0.68)
Growth		-0.56***	-0.44***
		(0.12)	(0.16)
Lack of Civil Liberties		-0.07	7.00***
		(0.46)	(2.38)
Lack of Civil Squared			-0.86***
			(0.28)
Muslim		0.43	-1.96
		(1.79)	(2.74)
Buddhist		11.92***	8.69***
		(2.25)	(2.94)
Hindu		-1.63	-5.54
		(2.45)	(7.91)
Others		11.62***	1.82
		(2.18)	(2.89)
Ethnic			-9.74
			(7.56)
Linguistic			17.60**
			(7.26)
Religious			0.81
			(4.06)
Constant	-21.90***	-59.30***	-75.64***
	(7.66)	(11.62)	(16.21)
Observations	109	109	109
Pseudo R-squared	0.02	0.10	0.16

[1] incidents with fatalities

Standard errors in parentheses

* significant at 10%; ** significant at 5%; ***significant at 1%

Table 1.14: Bilateral NB Cross Section Results for Separatist Terrorist Inicdents

Dependent Variable: Number of significant[1] separatist terrorist incidents in separatist region (1998-2006)				
Explanatory Variables	Separatist Region (Perpetrator's Area of Origin)			
	(1)	(2)	(3)	(4)
Separatist Area's Variables				
Log GDP per capita	-1.12***	-0.65**	-0.66**	
	(0.35)	(0.30)	(0.32)	
Log Relative GDP per capita[2]				1.06***
				(0.32)
Buddhist			1.54	-1.85
			(3.17)	(9.47)
Hindu			-0.56	-1.06
			(1.23)	(1.03)
Muslim			3.29***	1.62
			(1.04)	(1.21)
Others			-2.41	-4.42**
			(1.66)	(1.73)
Different religion				1.38
(from Mainland)				(1.01)
Mainland's Variables				
Log GDP per capita	0.64	0.15	0.45	
	(0.49)	(0.60)	(0.53)	
Log Population	0.20	-0.09	0.34	1.60***
	(0.35)	(0.36)	(0.32)	(0.46)
Growth			-0.08	0.09
			(0.07)	(0.07)
Lack of Civil Liberties		1.67	-1.38	7.71**
		(1.53)	(1.84)	(3.22)
Lack of Civil Squared		-0.26	0.10	-1.54***
		(0.19)	(0.24)	(0.54)
Ethnic			3.80	9.64***
			(3.29)	(3.54)
Linguistic			1.12	-14.22**
			(2.86)	(5.56)
Religious			-1.08	8.93**
			(2.20)	(3.70)
Gini Index				0.39***.
				-0.12
Constant	3.77	7.00	-1.09	-49.54***
	(8.35)	(8.96)	(10.96)	(14.56)
Observations	30	30	29	28
Pseudo R-squared	0.03	0.04	0.11	0.17

[1] incidents with fatalities

[2]Relative GDP per capita =GDP per capita of mainland/ GDP per capita of separatist area

Standard errors in parentheses

* significant at 10% ** significant at 5%; ***significant at 1%

Table 1.15: Countries Included in the Sample

Afghanistan	Fiji	Morocco	Zambia
Albania	Finland	Mozambique	Zimbabwe
Algeria	France	Namibia	Ukraine
Angola	Gabon	Nepal	United Arab Emirates
Argentina	Georgia	Netherlands	United Kingdom
Armenia	Germany	New Zealand	United States
Australia	Ghana	Nicaragua	Uruguay
Austria	Greece	Niger	Uzbekistan
Azerbaijan	Grenada	Nigeria	Venezuela
Bahamas	Guatemala	Norway	Vietnam
Bahrain	Guinea	Pakistan	Yemen
Bangladesh	Guyana	Panama	
Barbados	Haiti	Papua New Guinea	
Belarus	Honduras	Paraguay	
Belgium	Hungary	Peru	
Belize	Iceland	Philippines	
Benin	India	Poland	
Bolivia	Indonesia	Portugal	
Bosnia and Herzegovina	Iran	Qatar	
Botswana	Iraq	Romania	
Brazil	Ireland	Russia	
Bulgaria	Israel	Rwanda	
Burma (Myanmar)	Italy	Saudi Arabia	
Burundi	Jamaica	Senegal	
Cambodia	Japan	Serbia and Montenegro	
Canada	Jordan	Sierra Leone	
Central African Republic	Kazakhstan	Singapore	
Chad	Kenya	Slovakia	
Chile	Korea, South	Slovenia	
China	Kuwait	Somalia	
Colombia	Kyrgyzstan	South Africa	
Democratic Republic of Congo	Laos	Spain	
Republic of Congo	Latvia	Sri Lanka	
Costa Rica	Lebanon	Sudan	
Cote d'Ivoire	Lesotho	Suriname	
Croatia	Liberia	Swaziland	
Cuba	Libya	Sweden	
Cyprus	Lithuania	Switzerland	
Czech Republic	Luxembourg	Syria	
Denmark	Macedonia	Tajikistan	
Djibouti	Madagascar	Tanzania	
Dominican Republic	Malaysia	Thailand	
Ecuador	Maldives	Togo	
Egypt	Mali	Trinidad and Tobago	
El Salvador	Malta	Tunisia	
Eritrea	Mauritania	Turkey	
Estonia	Mexico	Turkmenistan	
Ethiopia	Mongolia	Uganda	

Table 1.16: Total Number of Terrorist Incidents in Different Regions

Regions	All	International	Domestic	Separatist
Africa	417	117	281	7
East & Central Asia	128	31	93	4
Eastern Europe	1348	106	620	615
Latin America & the Caribbean	1771	146	1622	3
Middle East / Persian Gulf	11443	800	7591	3041
North America	120	72	48	0
South Asia	4457	330	2443	1662
Southeast Asia & Oceania	1466	99	492	870
Western Europe	3037	240	579	2191
Total	24187	1941	13769	8393

Source: MIPT data set and author's categorization

Table 1.17: Types of Terrorist Incidents in Different Regions

		All	International	Domestic	Separatist
1972-2006	Number of Incidents	31449	8847	13763	8737
	Percentage	100	0.28	0.44	0.28
1998-2006	Number of Incidents	24023	1907	13763	8277
	Percentage	100	0.08	0.57	0.35

Source: MIPT data set and author's categorization

Table 1.18: Top 10 Most Common Countries of Terrorist Incidents

According to:	Number of Incidents	Number of Fatalities
Top 10 Countries/ Areas that Terrorist Incidents Occur (All Incidents)	Iraq (4842)	Iraq (18768)
	Kashmir (732)	United States (2996)
	Colombia (507)	India (1597)
	Afghanistan (454)	Kashmir (1582)
	Thailand (392)	Afghanistan (1505)
	India (361)	Colombia (1451)
	Pakistan (295)	Russia (1369)
	West Bank (291)	Pakistan (1293)
	Turkey (163)	Algeria (874)
	Israel (147)	Israel (755)
Top 10 Countries/ Areas of Terrorist's Origin in International Incidents	Iraq (253)	Afghanistan (3502)
	Afghanistan (94)	Iraq (1077)
	Pakistan (30)	Chechnya (263)
	Unknown (20)	Kenya (226)
	Saudi Arabia (16)	Pakistan (140)
	Colombia (15)	Uganda (132)
	Uganda (10)	Egypt (74)
	West Bank (10)	Unknown (57)
	Lebanon (10)	West Bank (56)
	Indonesia (9)	Angola (41)
	Philippines (8)	Malaysia (39)
Top 10 Target Countries in International Incidents	United States (154)	United States (4037) (2982 of it in Sept.11 2001)
	Turkey (70)	Russia (283)
	Unknown (42)	Unknown (256)
	United Kingdom (38)	Spain (223)
	International Org. (30)	United Kingdom (139)
	Pakistan (28)	International Org. (133)
	India (22)	Turkey (126)
	Israel (16)	Israel (107)
	Iran (14)	Pakistan (99)
	Russia (13)	India (79)
	Germany (12)	Sudan (72)
	Egypt (10)	Jordan (45)

Source: MIPT data set 1998-2006 according to author's categorization

Table 1.19: Separatist Terrorist Incidents in the World

Separatist Regions	*Mainland*	*Incidents*	*Incidents with Fatalities*	*Fatalities*
Abkhazia	Georgia	49	17	37
Aceh	Indonesia	33	12	58
Achik Land	India	2	0	0
Assam	India	182	74	321
Basque Area	Spain	854	42	55
Basque Area	France	33	1	1
Britanny	France	18	0	0
Catalonia	Spain	6	0	0
Chechnya	Russia	294	111	903
Corsica	France	500	7	10
Dagestan	Russia	74	26	288
East Timor	Indonesia	2	2	2
Ingushetia	Russia	23	8	11
Kashmir	India	1041	704	1441
Kayin State	Burma (Myanmar)	6	4	35
Kosovo	Serbia and Montenegro	117	29	39
Kuki	India	4	2	2
South Eastern Turkey	Turkey	254	84	199
Manipur	India	10	3	15
North Ossetia	Russia	7	1	1
Northern Ireland	United Kingdom62	2	27	58
Oromo	Ethiopia	7	4	6
Sardinia	Italy	1	0	0
South Maluku	Indonesia	1	1	4
Southern Philippines	Philippines	64	31	259
Southern Thailand	Thailand	765	325	423
Tamil	Sri Lanka	234	125	515
Tibet	China	2	0	0
Tripura	India	47	31	130
West Bank/Gaza	Israel	2551	387	1137
Xinjiang	China	5	4	53

Source: MIPT data and author's categorization

Chapter 2

Separatist Terrorism and Poverty in Southeastern Turkey

"Unemployment and poverty are natural supporters of terrorism in East and Southeastern Turkey. Would a person that has a job, buy his/ her food, send their children to school and have at least a minimum standard of living live on mountains and put their life on the line for nothing? Would that person be against government?", Deniz Gokce (Economist and Columnist), Aksam Newspaper, July 2008

2.1 Introduction

Turkey suffers from terrorism since 1980s. Although there have been many domestic and international terrorist incidents in Turkey, most of the terrorist incidents are separatist in nature. Separatist terrorism is defined as the terrorist incidents by separatist movements that aspire to autonomy for a particular group of people from a dominant political institution. Conventional wisdom sets economic deprivation in southeastern Turkey as one of the most important roots of terrorism and Kurdish-Turkish conflict in Turkey.

The deep political and contemporary belief on economic roots of terrorism in Turkey, necessitated for many projects in eastern and southeastern Turkey that will supposedly help to get rid of terrorism. Turkey will invest a projected total amount of $32 billion by 2010 to The Southeastern Anatolian Project (GAP), which is Turkey's largest development

project, and also, one of the largest development projects in the world. The Eastern Anatolia Development Project (DAP) has been approved by the Higher Planning Council in 2008 and Turkish government will invest $224 million in 106 other projects during this year. The Turkish Ministry of Finance is working on a recent law that enables zero income and corporate taxes in eastern and southeastern Turkey. In addition to all these, the Turkish Prime Minister announced recently that "The Turkish government is planning a broad series of investments worth as much as $12 billion in the country's largely Kurdish southeast, in a new economic effort intended to create jobs and draw young men away from militancy". [1]

In this paper I question whether poverty and bad economic conditions in southeastern Turkey causes separatist terrorist incidents Turkey. In the economic literature, most of the empirical findings are against the conventional wisdom in Turkey that poverty causes terrorism. Abadie (2004) finds that terrorist risk is not higher in poorer countries and political freedom is shown to affect terrorism more than economic conditions. Countries with intermediate range of political liberties are shown to be more prone to terrorism.

Krueger and Laitin(2007) show that the origins of international terrorism is unrelated to economics. Terrorists' countries of origin are the ones with low civil liberties, and the targets are mainly the richer countries. Many other studies mainly support findings of Krueger and Laitin (2007) that there are no economic roots of terrorism (Feldman and Ruffles, Krueger and Maleckova, 2003). A few studies on terrorism find that economic development and social welfare policies are important determinants of terrorism (Burgoon, 2006; Li and Schaub, 2004; Li 2005). Many of these studies focuses on the economic roots of international terrorism where the terrorist's country of origin is different from the target's

[1] New York Times, March 12 2008

country.

Whereas the previous literature finds that terrorism is unrelated to economic conditions, Derin Güre (2008) finds that the richer the country, the fewer the terrorist attacks committed abroad by the country's nationals. Similarly, author finds that when a country is richer, the country's nationals commit fewer terrorist attacks at home. To my knowledge Derin Güre(2008) is the first paper that considers the economic roots of separatist terrorism separately from domestic and international terrorism. She finds that among the separatist areas in the world, the number of separatist terrorist incidents are significantly higher in poorer separatist regions controlling for the economic conditions in the mainland.

As far as I know the only paper on the economic roots of terrorism in Turkey is Feridun and Sezgin (2008). This paper investigates the role of underdevelopment in southeastern Turkey in terrorism in Turkey by using 80 major terrorist incidents from 1987 to 2001 in Turkey.[2] Monthly data on separatist terrorist incidents and monthly interpolated yearly GDP series in southeastern Turkey have been used in estimations. Authors perform Principal Components Analysis on total GDP and its components in southeastern Turkey in order to reduce the number of potential explanatory variables. Using a limited, self-selected, monthly data set on 80 major terrorist incidents the authors perform logit estimations and find that there is a significant role of underdevelopment in eastern Turkey in the surge of terrorist attacks. The authors find evidence that agriculture and government services are more important components of GDP in explaining terrorism compared to trade, construc-

[2] Authors merge data from different sources like MIPT, Rodoplu, Arnold Ersoy(2004), Sebasteanski(2005), Turkish Daily News and Turkish Press.

tion, manufacturing and transportation.

This paper is different from Feridun and Sezgin (2008) in several aspects. First I consider the effect of regional underdevelopment in southeastern Turkey on only separatist terrorist incidents in Turkey, not all terrorist incidents. It is not clear why economic conditions in southeastern Turkey affect domestic or international terrorist incidents in Turkey. Mainly domestic terrorist incidents are perpetrated by Islamic or left-wing terrorist groups (the incidents included in Feridun and Sezgin (2008) perpetrated by DHKP/C, TKP/ML, TIKKO, IBDA/C, TIJ)[3] and there is no evidence that any of these groups emerge specifically from southeastern Turkey. In terms of international terrorist incidents it is even more obvious that economic conditions in southeastern Turkey is irrelevant to the incidents perpetrated by foreign terrorist organizations in Turkey (the incidents included in Feridun and Sezgin (2008) perpetrated by Abu Nidal organization and Hezbollah).

Secondly, Feridun and Sezgin (2008) use monthly interpolated data but I use yearly data in my main specification. Using monthly interpolation of the yearly GDP series that is one of the main variables of interest has its drawbacks and might not be very accurate. In addition to this it can be argued that longer term economic conditions in southeastern drive up the terrorist incidents not the monthly changes. In addition t this I run estimations using economic conditions in southeastern Turkey relative to the rest of the country (excluding southeastern Turkey) as well as the absolute economic conditions in southeastern Turkey using the yearly data.

One main difference of this paper from Feridun and Sezgin (2008) is the terrorist in-

[3]DHKP/C (Revolutionary People's Liberation Front), TKP-ML (Turkish Communist Party- Marxist-Leninist Organization), TIKKO (Turkish Workers and Peasants Army, IBDA/C (Islamic Great Eastern Raider's Front), TIJ(Turkish Islamic Jihad).

cidents data used. I use the Global Terrorism Database data on the number of separatist incidents with fatalities whereas Feridun and Sezgin (2008) uses a self-selected data set on 80 major terrorist incidents. It is not very obvious how these 80 incidents are selected and what is the main criteria for being a major incident. A comparison of the number of terrorist incidents in Turkey in the GTD data set and Feridun and Sezgin (2008) can be seen in Table 2.1.[4]

By using Global Terrorism Data Base (GTD) between 1975 to 2004[5], this paper investigates if poverty Granger causes separatist terrorism and vice versa in Turkey. I do vector autoregression (VAR) estimations using yearly data on significant separatist terrorist incidents (incidents with fatalities) in Turkey and GDP growth in southeastern Turkey as a proxy for the economic conditions in the area. The results suggests that there is a causal relation between economic conditions and separatist terrorist incidents. I do not find that improvements in economic conditions in relatively poorer southeastern Turkey cause a decrease in separatist terrorist incidents in Turkey, on the contrary, it increases the separatist terrorist incidents significantly in the following year. I perform several robustness checks using the Feridun and Sezgin (2008) data set as well as the quarterly interpolated series and a different categorization of separatist incidents.

Another view could be that it is not the absolute economic conditions in southeastern

[4]In 1993 there are no terrorist incidents in the GTD but 7 separatist incidents in Feridun and Sezgin (2008). To prevent any errors in the data, I checked the MIPT (Memorial Institute of Prevention of Terrorism) database and there are no separatist incidents in 1993 in the MIPT database as well. The incidents in Feridun and Sezgin (2008) that year are taken from two different articles (Rodoplu, Arnold and Ersoy, 2004; Sebasteanski, 2005). Definitional differences in terrorism in these papers might be the reason of having more terrorist incidents in 1993 in Feridun and Sezgin (2008). Also in 1992 the number of incidents in GTD data set is very high which might be a concern about the data set. The estimations are using GTD are also done by using year dummies for years 1992 and 1993 for robustness checks.

[5]Same estimations have been performed by using data from 1984 to 2004. The main results in the paper do not change significantly.

Turkey but the economic conditions in the area relative to the rest of the country that matters in terms of separatist terrorism. In contrast to the conventional wisdom, I find that when the GDP growth rates in southeastern Turkey relative to the growth rates in the rest of the country increases, the number of separatist terrorist incidents next year increases significantly.

The estimation results suggests that policy makers should be careful about using the economic policies in southeastern Turkey as a way to fight against separatist terrorism. Although economic policies to decrease the income discrepancies between relatively rich western and relatively poor southeastern Turkey might be desirable for several other reasons, I find that improvements in economic conditions in southeastern Turkey do not help to reduce separatist terrorism and might even increase it significantly. Therefore any development project that increases in government investments and other policies that increase GDP levels in southeastern Turkey should be taken cautiously, if the main aim is to fight against separatist terrorism in Turkey.

This chapter is organized as follows. Section, 2.2 presents background information on separatist terrorism in Turkey. Section 2.3 explains the data and its categorization. The empirical strategy and results are given in section 2.4 and I summarize my main conclusions in section 2.5.

2.2 Separatist Terrorism in Turkey

Terrorism in Turkey has its roots in domestic terrorism, which started in 1960s. Until 1980s terrorist incidents were held by ideologically motivated mostly left wing terrorist organizations. In 1980s , together with the ongoing domestic terrorism by left wing terrorist

groups, a new form of terrorism, separatist terrorism emerged. The separatist terrorist movement in Turkey has its roots in Kurdish nationalism. The main goal of separatist terrorism in Turkey is the establishment of an independent Kurdish state on the lands of southeastern Turkey, northern Iraq and parts of Iran and Syria. It has been argued through the years that one of the major reasons fueling the separatist terrorism in Turkey is the underdevelopment of Kurdish region in southeastern Turkey compared to more developed western regions of the country (Rodoplu et. al., 2004).

Most of the separatist terrorist incidents in Turkey has been perpetrated by PKK (Partiya Karkeren Kurdistan/ Kurdish Worker's Party). PKK is founded in 1974 by Abdullah Öcalan and formally named as PKK in 1978. The main goal of the terrorist organization is to establish a Kurdish state via a communist revolution in predominantly Kurdish southeastern Turkey. PKK started its terrorist attacks in 1978 in Eruh-Şemdinli province and carried its terrorist activities since then. The terrorist group is responsible for the vast majority of terrorist incidents and terrorism related casualties in Turkey. The group reportedly became involved in armed robberies and drug trafficking. It has also been argued that the group got external support from several countries (i.e. Iran, Lebanon, Libya, Syria).

The main focus of PKK terrorism in the 1980's had been rural areas in eastern and southeastern Turkey. At that time government facilities and personnel as well as Kurdish civilians that collaborate with Turkish government had been attacked. After 1990's, attacks included urban-based targets and moved beyond the rural areas. The group started to target tourist resorts and kidnapped foreign tourists and target Turkish interests in western Europe.

As a result of the First Gulf War in 1991, a de facto Kurdish state has been established

in northern Iraq, which created safe havens for Kurdish separatist terrorists and PKK militants. The PKK's leader Abdullah Öcalan was captured in Kenya in 1999. Following his arrest Öcalan announced a cease-fire and announced his desires to establish a peace initiative with Turkish government on Kurdish issues. In the year 2002 PKK changed its name to Kurdistan Freedom and Democracy Congress. The cease-fire with Turkish government ended in 2004 and terrorist attacks continued. In 2005, the group reverted to its original name. In 2005, the group announced a one month cease-fire but the attacks resumed afterwards.

Although PKK is the biggest separatist terrorist organization in Turkey there have been several other separatist terrorist organizations that carried terrorist attacks like Apo's Revenge Hawks, Apo's Youth Revenge Brigades, Kurdish Democratic Party, Kurdish Islamic Unity Party, Kurdish Patriotic Union, Kurdistan Freedom Hawks, Nationalist Kurdish Revenge Teams, People's Liberation Army of Kurdistan.

2.3 Data

In the vector autoregression estimations, I use GDP growth in southeastern Turkey as my main indicator of economic conditions in southeastern Turkey. Although GDP data is easily found in many developed and even developing countries including Turkey, there are limitations in the GDP data at the province level.[6] GDP data on provinces are available from 1975-2001 in Turkey. I will use the GDP level data in the 11 provinces of southeastern Turkey. Following Feridun and Sezgin (2008) these 11 provinces which are mostly affected by

[6] GDP data is not available in regions like southeastern Turkey therefore I use province level GDP data to generate the GDP level in southeastern Turkey.

the separatist terrorism and terror related Kurdish-Turkish conflict are Adıyaman, Bingöl, Bitlis, Diyarbakır, Elazığ, Hakkari, Mardin, Muş, Tunceli, Van, Siirt in Turkey.[7] Real GDP data are taken from Turkish State Institute of Statistics between 1987 to 2004. From 1975 to 1987 province level real GDP per capita data is taken from Karaca (2004).

Using the Augmented Dickey-Fuller test and Phillips-Perron test for unit root I find that log real GDP per capita in southeastern Turkey is not stationary whereas the real GDP per capita growth in southeastern Turkey is stationary. The unit root test results can be seen in Table 2.2. Therefore I will use real GDP per capita growth as a proxy for the economic conditions in southeastern Turkey.

In addition to the GDP growth rates in southeastern Turkey, I also use relative GDP growth in southeastern Turkey which is the GDP growth rates in southeastern Turkey minus the GDP growth in the rest of the country (GDP growth in Turkey excluding southeastern Turkey) in the estimations.

Alternatively, total government investments or unemployment rates could be used as a proxy for economic conditions in southeastern Turkey. Although monthly unemployment rates in provinces are available, it has been started to be published after 2004. Total government investments in provinces are available only from 1999 to 2006. Therefore because of the limitations in the data, I can neither use total government investments nor unemployment rates as a proxy for economic conditions in my estimations.

Separatist Terrorism data in Turkey are taken from Global Terrorism Data base (GTD).[8]

[7] In 1991 Siirt is dividend into three provinces named as Siirt, Batman and Şırnak. The data for these three different provinces is combined after 1991.

[8] Another comprehensive data set on terrorism is MIPT (Memorial Institute of Prevention of Terrorism) database. In this paper I can not use MIPT data as well because MIPT has information on separatist incidents only after 1998. MIPT includes data on international terrorism since 1968.

Global terrorism database is the newest database on terrorism. The database includes information from different and trustable databases including the Memorial Institute for Prevention of Terrorism (MIPT) database and include information on terrorist incidents all over the world from 1970 to 2004. Unlike many other databases on terrorism GTD includes information on domestic and separatist terrorist incidents as well as international terrorist incidents.

In order to categorize the terrorist incident as separatist terrorist incident, the terrorist organizations responsible for the attack were checked. If PKK or other separatist terrorist organizations claim responsibility of an incident, I categorize the incident as separatist terrorist incident. This categorization is limited in the sense that even though an incident is separatist in nature (Kurdish separatists are responsible from the attack) if no separatist terrorist organization claim responsibility from the attack or the terrorist organization is unknown, I cannot count them as separatist terrorist incidents. Robustness checks have been done by categorizing the incidents that separatist terrorist organizations are responsible and the incidents that no terrorist organization claim responsibility as separatist incidents. It is a less precise categorization than the initial categorization and the main results in the paper do not change. I am interested in all the separatist incidents in Turkey therefore the separatist terrorist incidents are not limited to the incidents that occur in southeastern Turkey. PKK and other separatist groups were engaged in urban bombings and suicide missions after 1990s. Therefore there are many incidents took place in western and central Turkey (like Istanbul and Ankara and tourist locations).

Robustness checks are also done using quarterly series. The GDP growth data is available yearly therefore I interpolate the data to get quarterly series from yearly series. The

proportional Denton method of interpolation has been used imposing the constraints that the interpolated series holds the annual totals.[9] Denton (1971) developed interpolation methods based on moment preservation. According to Denton interpolation the benchmarked quarterly series should reproduce the movement in the original yearly series. Using interpolated data has its own problems. Even though one can increase the number of observations in the estimations by using interpolation the new information added by interpolated growth rates are limited. Also one can think that terrorism takes more time to breed than quarter years. Therefore it might be possible that terrorism doesn't respond to quarterly changes in GDP growth but to yearly changes.

2.4 Empirical Strategy and Results

To estimate the effect of economic conditions in southeastern Turkey on separatist terrorist incidents in Turkey and vice versa, I employ vector autoregression estimations by using the Global Terrorism Database. My basic specification is:

$$\begin{pmatrix} Terror_t \\ Econ_t \end{pmatrix} = v + A_1 \begin{pmatrix} Terror_{t-1} \\ Econ_{t-1} \end{pmatrix} + ... + A_p \begin{pmatrix} Terror_{t-p} \\ Econ_{t-p} \end{pmatrix} + BX_t + u_t$$

where $Terror_t$ is the number of separatist terrorist incidents with fatalities in Turkey, $Econ_t$ is the variable showing the economic conditions in Turkey namely GDP growth and relative GDP growth, X_t is a vector of exogenous variable, v is a fixed vector of intercept terms and u_t is the vector of error terms.

The main focus in empirical analysis is whether changes in economic conditions in southeastern Turkey cause a decrease in the separatist terrorism in Turkey and vice a versa. I will

[9] Denton Stata module has been used in calculations.

use Granger (1969) causality test to do so. In VAR estimation, *Econ* variable Granger-cause variable *Terror* if lagged values of *Econ* has a predictive power over the current value of *Terror*, conditional on lagged values of *Terror* variable. Granger causality test can be criticized if the disturbance term that uses *Terror* variable as dependent variable is correlated with the past values *Econ* variables. National security measures taken by the government that can affect the successful separatist terrorist attacks might increase as a result of the improvement in economic conditions. On the other hand, these measures might be affected by the changes in the economic conditions in Turkey as a whole, not only by the economic conditions in southeastern Turkey.

In VAR estimations I use period dummies as exogenous variables. I use post-war period dummy to show the period after the First Gulf war, after which a de facto Kurdish state in Northern Iraq was established. As it has been argued before, this created safe havens for separatist terrorists in Turkey. Secondly I use the cease-fire period from 1999 until the end of 2003 as the second period dummy. In 1999 Abdullah Öcalan is captured and he asked for a cease of fire. The third period dummy used shows the period that the cease of fire is ended by PKK in year 2004.

The VAR estimation results using the number of separatist incidents with fatalities and GDP growth in Turkey without and with period dummies are shown in Tables 2.3 and 2.4 respectively. Tables 2.3 and 2.4 show that GDP growth in southeastern Granger cause separatist terrorist incidents but not vice versa in Turkey. In contrast to the conventional wisdom I find that increases in GDP growth rates in southeastern Turkey in the previous year increases the separatist terrorist incidents this year. The estimation results do not change much for different lag lengths and with the inclusion of period dummies.

Figure 2-2 show the impulse response and cumulative impulse response functions using GTD data. Impulse response functions show that increase in GDP growth rates in southeastern Turkey, increase the separatist incidents for the following two years and then decrease to the average levels. This finding might seem counter intuitive. One possible explanation could be that income inequality in southeastern Turkey is quite high and much higher than the western part of the country. Most of the people work on agriculture where the land is owned by a wealthy landowner called "Ağa".(Kudat, 1970; Ilcan, 1994; Serif Mardin, 1998) The agricultural workers work with very little amount of payment made by the landowner. Because of this agricultural system called "Ağalık" it can be argued that changes in GDP levels or GDP growth rates do not affect the worker's income and therefore does not change the opportunity cost of being a terrorist. Alternatively, it is a well known fact that separatist terrorists get some funding from the wealthy landowners, merchants and citizens in southeastern Turkey in the name of a tax.[10] GDP growth might increase the income in the area and therefore increase the amount of payments they make to the separatist terrorist organizations like PKK. As these terrorist organizations get more funding they might increase the number of terrorist attacks.[11]

[10] "Eight people including village guards and members of Democratic Society Party (a Kurdish nationalist political party in Turkey) are arrested for collecting taxes from residents and tradesmen for terrorist organization PKK in Hakkari Semdinli." Cihan News Agency, November 2, 2007.

"Semdin Sakik's (a former high ranking PKK terrorist that was captured in 1999) court statement shows how the income that is given back by tax amnesties are used. Sakik says "... We (PKK) got 200 million Turkish lira from the contractor building a water channel in Hazro in 1992. We got one billion Turkish lira from Batman Barrage in 1993. We were supposed to get another one billion but we couldn't get that money as by mistake we bombed the barrage." Semdin Sakik is using the word tax in his statements and I do not think it is a mistake. If Turkish government can not protect its road in southeastern Turkey, PKK will block the road. If government can not send men to military service, PKK will make them go to the mountains as terrorists. In a similar fashion, PKK will tax the incomes that the government can not touch. So the main conclusion is that the tax Turkish government can not collect will come back to you and your children as bullets." Enis Berberoglu (columnist), Hurriyet Newspaper; April 27, 1998

[11] Unfortunately data is not available on income inequality in different provinces in Turkey and the wages of agricultural workers in southeastern Turkey.

An alternative argument would be that rather than the absolute economic conditions in southeastern Turkey, the economic conditions in the area relative to the rest of the country is important. Derin Güre (2008) using MIPT data on the separatist regions in the world finds that economic conditions in the separatist regions with respect to the mainland matters. The VAR estimation results using the number of separatist incidents with fatalities in Turkey and relative GDP growth in southeastern part of the country (GDP growth in southeastern Turkey minus GDP growth in the rest of the country) with and without period dummies are shown in Tables 2.5 and 2.6. Tables 2.5 and 2.6 again show that relative GDP growth Granger causes separatist terrorism but not the vice versa. I find that increases in relative GDP growth, increases the separatist terrorist incidents next year significantly. The results are robust for different lag lengths and inclusion of period dummies. Figure 2-3 show the impulse response and cumulative impulse response functions using relative GDP growth in southeastern Turkey . Impulse response functions show that a one point increase in relative GDP growth rate in southeastern Turkey, increases the separatist terrorist incidents by five incidents in the following year.

VAR estimations using yearly data and real GDP per capita growth are done by using the data set given in Feridun and Sezgin (2008) and the results are given in table 2.7. As the data set covers data from 1987 to 2001 the number of observations and degrees of freedom is quite low. In contrast to the findings in Feridun and Sezgin (2008) using monthly interpolated data, yearly results do not show any evidence that underdevelopment in southeastern Turkey causes separatist terrorism in southeastern Turkey and the results even suggest that increases in GDP growth increases the separatist incidents in the following years.

Robustness checks are done using quarterly interpolated data as shown in Table 2.8. Instead of using monthly interpolation as in Feridun and Sezgin (2008), I use quarterly interpolation as it is more plausible that changes in economic conditions longer than a month period might result in changes in separatist terrorism in Turkey. Using Global terrorism data on separatist terrorism in Turkey and quarterly interpolated data on GDP growth, I do not find any causal relationship between economic conditions in southeastern Turkey and separatist terrorism in Turkey. In contrast to the political conventional wisdom, any increase in government investments in Turkey does not decrease separatist terrorism in future quarters.

2.5 Conclusion

Turkey is one of the countries in the world that suffers from the highest number of separatist terrorist incidents. Terrorism and ways to fight against terrorism have long been debated in media and politics. Until now the economic deprivation and poverty in southeastern Turkey compared to the western Turkey which enjoys much better economic conditions have been seen as one of the most important reasons of separatist terrorism in Turkey. Therefore many economic policies have been implemented to improve the economic conditions in southeastern Turkey for the sake of decreasing the number of terrorist incidents in Turkey.

In this paper I question whether there is a causal relationship between economic conditions in highly Kurdish populated southeastern Turkey and separatist terrorism. I find that there is a causal relationship between economic conditions and terrorism. In contrast to the conventional wisdom improvements in absolute economic conditions do not decrease the separatist incidents and do even increase the separatist terrorist incidents in the first

year. I also find that economic improvements in southeastern Turkey relative to the rest of the country, increases the chances of terrorism.

These results suggest that policy makers should be very careful about policies that intend to improve the economic conditions in southeastern Turkey to fight against separatist terrorism. I find that these policies might not decrease terrorism in Turkey and might even increase it significantly.

The results in this paper are presented in this paper using the most up-to-date and trustable international terrorism databases. An important drawback of western-based databases is that they might be rather limited in terrorist incidents in developing countries, including Turkey. This necessitates a more detailed study for the terrorist incidents in Turkey. I leave this as a future study.

Table 2.1: Terrorist Incidents and GDP data in Turkey

Terrorist Incidents with Fatalities in Turkey (GTD) versus Feridun and Sezgin(2008) and GDP in Southesatern Turkey								
	Terrorist Incidents in Global Terrorism Database					Terrorist Incidents In Feridun and Sezgin (2008)		GDP*** in Southeastern Turkey
Years	Separatist	International	Domestic	Unknown	Total	Separatist*	Total**	
1975	0	0	0	0	0	-	-	537623
1976	0	1	1	1	3	-	-	583044
1977	0	2	1	18	21	-	-	586283
1978	0	2	3	12	17	-	-	573599
1979	1	5	12	54	72	-	-	544395
1980	0	4	30	37	71	-	-	510020
1981	0	0	2	2	4	-	-	523400
1982	0	1	0	0	1	-	-	512170
1983	0	1	0	0	1	-	-	498567
1984	4	0	2	1	7	-	-	467350
1985	0	1	0	0	1	-	-	511466
1986	4	1	1	1	7	-	-	523142
1987	16	0	0	14	30	4	5	602203
1988	18	1	0	3	22	3	4	614604
1989	57	0	1	5	63	2	5	575300
1990	97	0	14	22	133	1	2	632046
1991	53	6	24	26	109	1	3	772269
1992	239	2	30	48	319	5	6	802739
1993	0	0	0	0	0	7	8	792851
1994	114	3	8	25	150	6	7	718118
1995	28	2	3	24	57	6	6	704385
1996	18	1	2	10	31	4	5	726004
1997	12	1	1	4	18	3	3	796504
1998	7	1	1	4	13	5	9	815575
1999	16	1	14	20	51	2	5	769142
2000	4	0	2	3	9	0	7	732448
2001	1	1	3	0	5	1	5	736080
Total	689	37	155	334	1215	50	80	

* Calculated by from the data set given in Feridun and Sezgin (2008).

** The number of terrorist incidents used in estimations by Feridun and Sezgin (2008).

***Real GDP per capita (base year=1987) in TL in southeastern Turkey.

Table 2.2: Tests for Stationarity

Tests for Stationarity		
	ADF statistic	*PP statistic*
Seperatist Incidents with fatalities (GTD)	-5.332 (0.00)	-5.296 (0.00)
Log GDP in southeastern Turkey	-2.568 (0.10)	-2.088 (0.25)
GDP Growth in southeastern Turkey	-4.26 (0.00)	-4.13 (0.00)
Log Government Investments in southeastern Turkey	-8.166 (0.00)	-5.357 (0.00)

MacKinnon approximate p-value in parentheses
Tests have the null hypothesis that the variable has a unit root.
Null Hypothesis are accepted when p-values are greater than 0.05

Table 2.3: Vector Autoregression Estimation Results

Vector Autoregression Results (Global Terrorism Database)

Yearly Data (1977-2001)

Dependent Variable:	Separatist Terrorist Incidents			GDP Growth (in southeastern Turkey)		
Separatist Terrorist Incidents	(1)	(2)	(3)	(6)	(7)	(8)
t-1	0.11	-0.03	-0.17	0.02	0.04*	0.07**
	(0.18)	(0.16)	(0.21)	(0.02)	(0.02)	(0.03)
t-2		0.52***	0.49***		-0.03	-0.01
		(0.15)	(0.17)		(0.02)	(0.02)
t-3			0.20			-0.02
			(0.19)			(0.03)
GDP Growth (in southeastern Turkey)						
t-1	2.93**	2.24*	2.47*	0.24	0.38**	0.21
	(1.40)	(1.22)	(1.40)	(0.19)	(0.18)	(0.20)
t-2		1.35	1.63		-0.45**	-0.38*
		(1.29)	(1.37)		(0.19)	(0.20)
t-3			-0.05			-0.35
			(1.50)			(0.21)
Constant	21.55**	11.70	11.54	(0.12)	0.46	0.47
	(10.86)	(9.77)	(10.18)	(1.45)	(1.44)	(1.46)
Chi^2 for joint sig.(p value)	4.99	20.73	22.18	2.53	10.03	13.41
	(0.08)	(0.00)	(0.00)	(0.28)	(0.04)	(0.04)
R^2	0.17	0.46	0.49	0.09	0.29	0.37
Observations	25	24	23	25	24	23
Granger Causality Test	4.36	5.70	7.06	0.74	4.32	5.38
Chi^2 (p value)	(0.04)	(0.06)	(0.07)	(0.39)	(0.12)	(0.15)

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: Similar results are found, using yearly data from 1984-2001.

Table 2.4: Vector Autoregression Estimation Results with Period Dummies

Vector Autoregression Results (Global Terrorism Database), Yearly Data (1977-2001) with Period Dummies						
Dependent Variable:	Separatist Terrorist Incidents			GDP Growth (in southeastern Turkey)		
Separatist Terrorist Incidents	(1)	(2)	(3)	(6)	(7)	(8)
t-1	0.001	-0.01	-0.18	0.03	0.05**	0.06**
	(0.19)	(0.17)	(0.20)	(0.03)	(0.03)	(0.03)
t-2		0.55***	0.71***		-0.02	0.02
		(0.18)	(0.21)		(0.03)	(0.03)
t-3			0.43*			0.003
			(0.23)			(0.03)
GDP Growth (in southeastern Turkey)						
t-1	2.62*	2.26*	2.77**	0.25	0.37**	0.23
	(1.41)	(1.26)	(1.36)	(0.19)	(0.18)	(0.20)
t-2		1.39	2.21		-0.44**	-0.32
		(1.29)	(1.34)		(0.19)	(0.20)
t-3			-0.78			-0.42*
			(1.51)			(0.22)
Periods						
Post-war	32.51	-7.87	-47.12	-3.81	-7.87	-4.94
	(22.11)	(22.47)	(29.01)	(2.98)	-22.47	(4.28)
CeaseFire	2.61	-1.45	0.50	-2.10	-1.45	-1.08
(post-Ocalan capture)	(35.74)	(30.32)	(28.97)	(4.82)	(30.32)	(4.27)
Constant	14.37	12.83	15.35	0.9		1.01
	(12.19)	(10.76)	(10.58)	(1.64)		(1.56)
Chi^2 for joint sig. (p value)	7.60	20.96	27.37	4.40	11.15	15.59
	(0.10)	(0.00)	0.00	(0.35)	(0.08)	(0.05)
R^2	0.23	0.47	0.54	0.15	0.32	0.40
Observations	25	24	23	25	24	23
Granger Causality Test	3.46	5.49	9.86	1.69	4.62	6.51
Chi^2 (p value)	(0.06)	(0.06)	(0.02)	(0.19)	(0.10)	(0.09)

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: Similar results are found, using yearly data from 1984-2004.

Table 2.5: Vector Autoregression Estimation Results with Relative GDP Growth

Vector Autoregression Results (Global Terrorism Database), Yearly Data, (1977-2001)
Relative GDP Growth in Southeastern Turkey

Dependent Variable:	Separatist Terrorist Incidents			Relative GDP Growth (in southeastern Turkey)		
Separatist Terrorist Incidents	(1)	(2)	(3)	(6)	(7)	(8)
t-1	0.12	0.03	-0.18	0.001	0.01	0.05
	(0.17)	(0.15)	(0.20)	(0.02)	(0.03)	(0.04)
t-2		0.57***	0.49***		-0.02	-0.01
		(0.14)	(0.15)		(0.02)	(0.03)
t-3			0.27			-0.05
			(0.18)			(0.03)
Relative GDP Growth (in southeastern Turkey)						
t-1	4.09***	4.18***	4.84***	0.001	0.01	-0.07
	(1.52)	(1.17)	(1.19)	(0.21)	(0.21)	(0.22)
t-2		-0.14	0.67		-0.27	-0.4
		(1.36)	(1.42)		(0.24)	(0.26)
t-3			1.14			-0.05
			(1.35)			(0.25)
Constant	31.04***	18.37*	23.86**	-1.15	-1.48	-1.71
	(10.69)	(9.76)	(10.57)	(1.50)	(1.76)	(1.95)
Chi^2 for joint sig.(p value)	7.89	31.37	36.84	0.02	1.74	3.79
	(0.01)	(0.00)	(0.00)	(0.98)	(0.78)	(0.71)
R^2	0.24	0.57	0.62	0.00	0.07	0.14
Observations	25	24	23	25	24	23
Granger Causality Test	7.20	12.76	16.81	0.02	0.72	2.51
Chi^2 (p value)	(0.00)	(0.00)	(0.00)	(0.88)	(0.70)	(0.47)

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Relative GDP growth = Real GDP per capita growth in southeastern Turkey - Real GDP per capita growth in the rest of Turkey.

Table 2.6: Vector Autoregression Estimation Results, Rel. GDP Growth and Period Dummies

Vector Autoregression Results (Global Terrorism Database), Yearly Data (1977-2001) with Period Dummies
Relative GDP Growth in Southeastern Turkey

Dependent Variable:	Separatist Terrorist Incidents			Relative GDP Growth (in southeastern Turkey)		
Separatist Terrorist Incidents	(1)	(2)	(3)	(6)	(7)	(8)
t-1	-0.02	0.04	-0.18	0.01	0.04	0.05
	(0.18)	(0.17)	(0.19)	(0.03)	(0.03)	(0.04)
t-2		0.58***	0.66***		0.01	0.04
		(0.16)	(0.24)		(0.03)	(0.04)
t-3			0.42*			-0.01
			(0.23)			(0.04)
Relative GDP Growth (in southeastern Turkey)						
t-1	4.03***	4.16***	4.86***	0.01	0.03	-0.04
	(1.44)	(1.18)	(1.17)	(0.21)	(0.20)	(0.21)
t-2		-0.19	0.69		-0.38	-0.42*
		(1.42)	(1.40)		(0.24)	(0.25)
t-3			0.11			-0.36
			(1.74)			(0.31)
Periods						
Post-war	37.92*	30.36	30.21	-3.93	-5.49	-7.97
	(20.44)	(20.87)	(31.06)	(2.95)	(3.57)	(5.59)
CeaseFire	-0.64	-3.78	-8.26	0.78	1.39	1.83
(post-Ocalan capture)	(32.57)	(26.86)	(25.36)	(4.69)	(4.59)	(4.56)
Constant	22.66**	19.05*	24.35**	-0.34	-1.25	-2.17
	(11.49)	(10.40)	(11.01)	(1.66)	(1.78)	(1.98)
Chi^2 for joint sig. (p value)	12.58	31.46317	39.46	1.97	4.56	6.46
	(0.01)	(0.00)	(0.00)	(0.74)	(0.60)	(0.60)
R^2	0.33	0.57	0.63	0.07	0.16	0.22
Observations	25	24	23	25	24	23
Granger Causality Test	7.81	12.38	17.75	0.19	1.47	2.76
Chi^2 (p value)	(0.005)	(0.002)	(0.00)	(0.67)	(0.48)	(0.43)

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Relative GDP growth = Real GDP per capita growth in southeastern Turkey - Real GDP per capita growth in the rest of Turkey.

Table 2.7: Vector Autoregression Results using Feridun and Sezgin(2008)

Vector Autoregression Results using data in Feridun and Sezgin (2008)
Yearly Data, (1987-2001)

Dependent Variable:	All Major Terrorist Incidents			GDP Growth (in southeastern Turkey)		
All Major Terrorist Incidents	(1)	(2)	(3)	(6)	(7)	(8)
t-1	0.27	0.26	-0.50***	-2.59***	-3.10***	-2.51***
	(0.32)	(0.28)	(0.16)	(0.99)	(0.63)	(0.42)
t-2		0.87***	1.07***		-2.43***	-4.41***
		(0.31)	(0.21)		(0.69)	(0.57)
t-3			1.55***			-3.63***
			(0.20)			(0.55)
GDP Growth (in southeastern Turkey)						
t-1	0.08	0.17*	0.21***	-0.09	-0.41**	-1.07***
	(0.09)	(0.09)	(0.07)	(0.26)	(0.21)	(0.19)
t-2		0.19***	0.43***		-0.52***	-1.07***
		(0.07)	(0.04)		(0.15)	(0.12)
t-3			0.35***			-0.83***
			(0.04)			(0.12)
Constant	3.88**	-1.03	-7.28***	15.16***	32.90***	63.61***
	(1.87)	(2.69)	(2.43)	(5.75)	(5.97)	(6.60)
Chi^2 for joint sig.(p value)	1.06	13.621	131.93	8.94	57.76	315.0786
	(0.59)	(0.008)	(0.00)	(0.01)	(0.00)	(0.00)
R^2	0.08	0.53	0.92	0.41	0.83	0.97
Observations	13	12	11	13	12	11
Granger Causality Test	0.94	13.35	108.51	6.85	29.23	102.46
Chi^2 (p value)	(0.33)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)

Standard errors in parentheses

The number of terrorist incidents in Feridun and Sezgin (2008) is used in estimations.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2.8: Vector Autoregression Results, Quarterly Data

Vector Autoregression Results (Global Terrorism Database) (1976q1 -2001q4)				
Dependent Variable:	Separatist Terrorist Incidents		GDP Growth (in southeastern Turkey)	
Separatist Terrorist Incidents	(1)	(2)	(1)	(2)
t-1	0.96***	0.94***	0.01	0.01
	(0.09)	(0.10)	(0.01)	(0.01)
t-2	-0.54***	-0.54***	0.001	0.001
	(0.12)	(0.12)	(0.01)	(0.01)
t-3	0.27***	0.24**	-0.01	-0.01
	(0.09)	(0.10)	(0.01)	(0.01)
GDP Growth (in southeastern Turkey)				
t-1	-0.29	-0.1	1.49***	1.47***
	(1.53)	(1.53)	(0.10)	(0.10)
t-2	-1.04	-1.06	-0.63***	-0.62***
	(2.58)	(2.57)	(0.16)	(0.16)
t-3	1.7	1.57	-0.05	-0.06
	(1.53)	(1.54)	(0.10)	(0.10)
Periods				
Post-war		2.91		-0.15
		(2.46)		(0.16)
CeaseFire		-1.2		-0.12
(post-Ocalan capture)		(3.60)		(0.23)
Constant	1.91*	1.5	0.02	0.07
	(1.12)	(1.29)	(0.07)	(0.08)
Chi^2 for joint sig.(p value)	117.96	139.73	966.01	977.12
	(0.00)	(0.00)	(0.00)	(0.00)
R^2	0.53	0.57	0.90	0.90
Observations	104	104	104	104
Granger Causality Test				
Chi^2 (p value)	3.42	2.578	5.10	5.58
	(0.33)	(0.46)	(0.17)	(0.13)

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 2-1: Separatist Terrorist Incidents in Turkey (1975-2004)

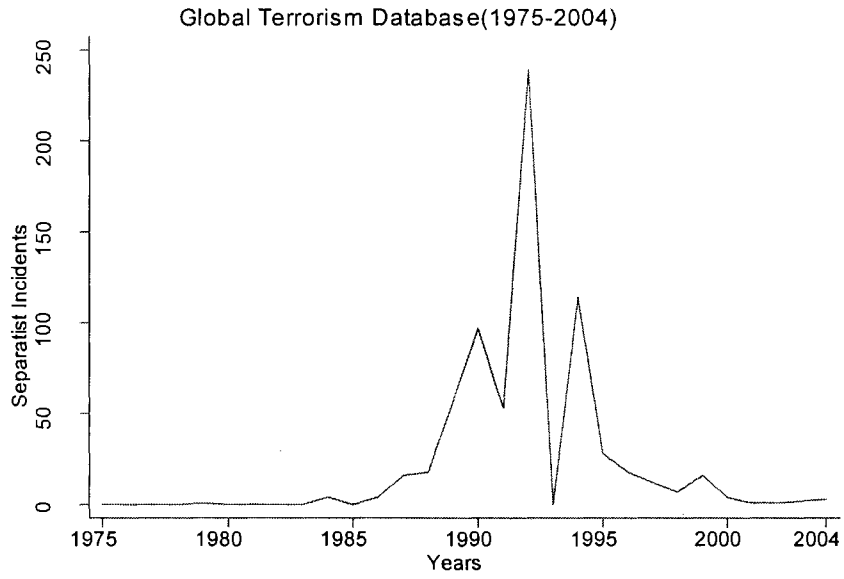
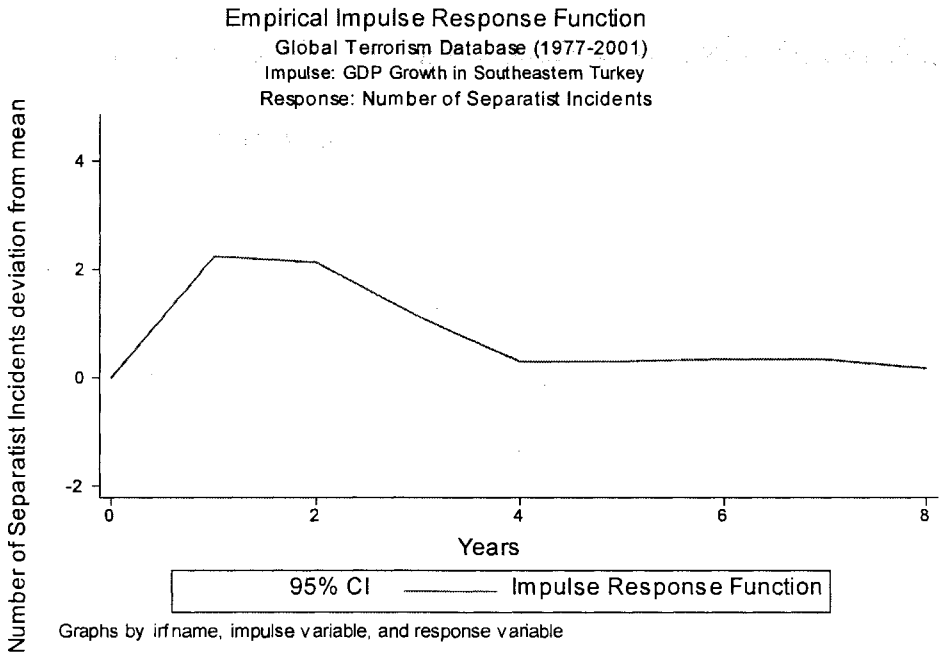


Figure 2-2: Impulse Response Functions



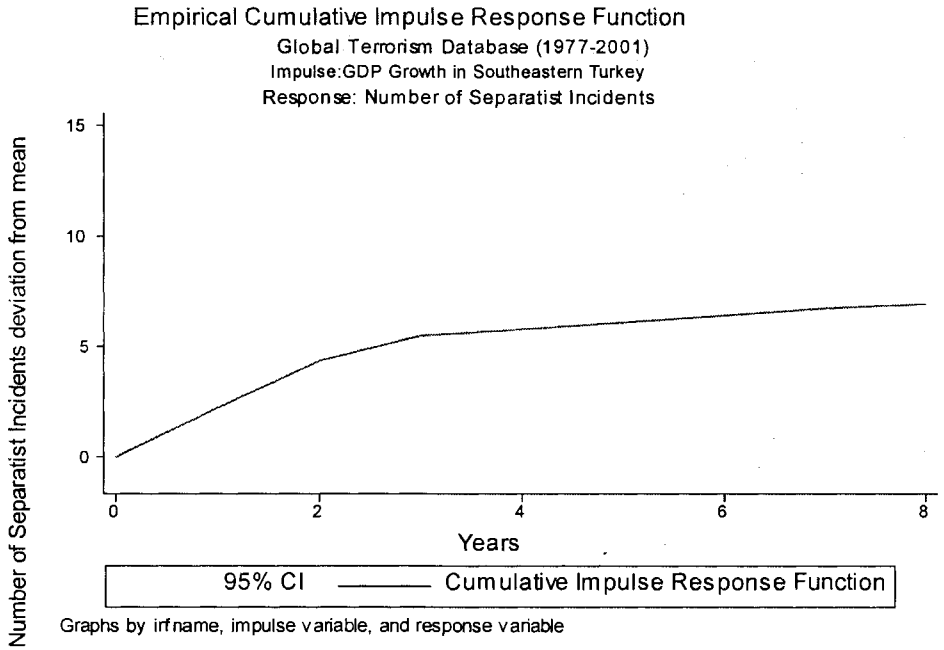
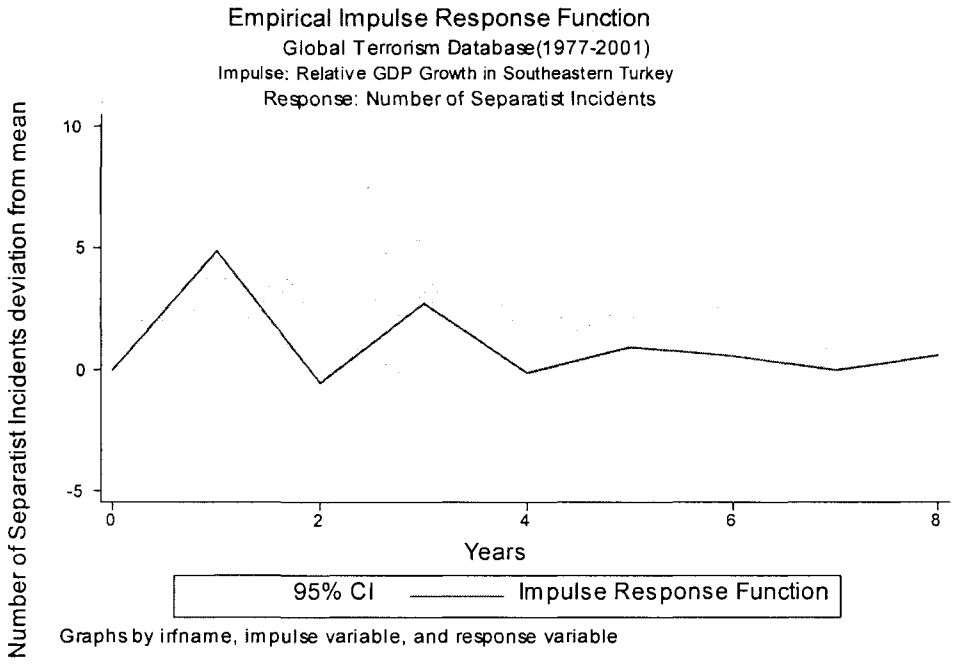
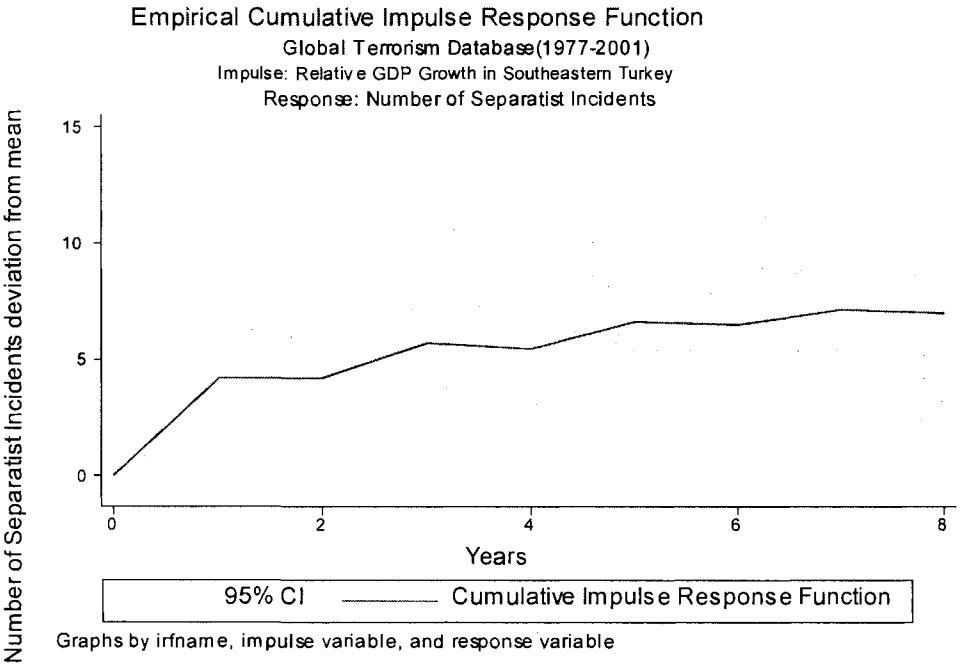


Figure 2-3: Impulse Response Functions, Relative GDP Growth





Chapter 3

Charitable Giving under Inequality Aversion[1]

3.1 Introduction

According to the 2005 population reports of the US Census Bureau, there are 37 million people in poverty in the United States. How do you actually feel about that? Do you think that there should be income differences, or are you really unhappy about it? Surprisingly, your answer not only relates to your inner world but also has significant effects on your charitable contributions. The main purpose of this paper is to study the impact of inequality aversion (alternatively, egalitarianism) on voluntary provision of public goods, namely charitable giving. Giving USA report mentions that individual charitable giving, which is the largest source of total giving, rose by an estimated 4.1 percent to reach $187.92 billion in 2005. Considering the large monetary amount of individual giving made each year, finding its determinants has considerable implications.

Fairness considerations have been documented in many aspects in the economic literature before. Alesina, Di Tella and MacCulloch (2004) find a negative correlation between inequality in a society and happiness of its members. Alesina and Angeletos (2005) argue

[1] **Co-authored with Neslihan Uler**

that different beliefs about the fairness of social competition and what determines income inequality influence the redistributive policy chosen democratically in a society.[2] Guth *et. al* (1982), Kahneman, Knetsch and Thaler (1986), among others, demonstrate that people value fairness and they are willing to resist an unfair distribution even at a positive cost. Fehr and Schmidt (1999), and Fehr and Gachter (2000) demonstrate that contributions to public goods are affected by fairness considerations. In a theoretical model, Fehr and Schmidt show that, if people are inequality averse, an equilibrium where people contribute positive amounts to a public good could be sustained as well as the standard "free-riding" equilibrium. In their paper, cooperation is due to the ability of agents to use punishment against non-contributors. Henrich *et. al* (2001, 2005) demonstrate the importance of social sanctions on fair division in small-scale economies.

A question that arises is that how cooperation in charitable giving is sustained in large-scale societies such as the US where punishments to non-contributors are not possible. In this paper, we are interested in investigating whether individuals' contribution decisions to charities are affected by pure fairness considerations without any social sanctions. It is surprising that inequality aversion has not been incorporated in any empirical research on voluntary public goods provision.[3] As a part of the fairness literature, this paper attempts to show whether the dislike towards inequality, inequality aversion or egalitarianism, has significant effects on charitable giving.

We consider a simple theoretical model where individuals care about the income inequality as well as their own contributions to the public good. Andreoni (1989, 1990) argues that

[2] In addition, Uler (2007) provides theoretical and experimental evidence that charitable giving increases with the level of redistributive taxation.

[3] For detailed surveys on charitable giving literature see Vesterlund (2006), and Clotfelter (2002).

people are impure altruists; that is, they enjoy contributing to charities. Andreoni shows that traditional models of altruism are inconsistent with the findings that government grants only partly crowd out private donations and that the amount of individual contributions are significantly large.[4] Therefore, we will adopt his model while we incorporate inequality aversion. We show that high-income individuals contribute more to the public good as they get more inequality averse; whereas low-income individuals contribute less to the public good as they get more inequality averse. We also show that wealthier individuals contribute more given a fixed degree of inequality aversion.

The US General Social Survey (GSS) data from 1996 is used to support the theoretical foundations of the paper. Proxies for the private provision of public goods and the degree of inequality aversion (egalitarianism) are used. The empirical results are found using monetary voluntary contributions for 1996, and for robustness check we employ a multinomial variable in charitable giving using GSS data from 2002.[5] Inequality aversion data, as well as other relevant variables that can potentially affect voluntary contributions, are used in Tobit estimations.

The empirical results support the theoretical findings. When we consider contributions of all kinds together, we find that inequality aversion has a significant effect on the degree of charitable giving. When we look at the low-income and high-income groups separately, we find that as inequality aversion increases, charitable contributions increase for the high-income group and decrease for the low-income group. People who mention that they are

[4] Ribar and Wilhelm (2002) show that, at the margin, donations to charities appear to be motivated solely by joy-of-giving preferences.

[5] Another robustness check had been done using the World Values Survey data for the OECD countries. Although it supports the model's findings we do not include the results in the paper as the public good data used in those regressions are very restrictive (charitable giving for preventing environmental pollution was used). Results are available from the authors upon request.

below or far below average income are considered as low-income (poor) individuals, people who mention that they are above or far above the average are considered as high-income (rich) individuals.

In 3.2, we construct a theoretical model with inequality aversion. In Section 3.3, we describe the inequality aversion and public goods provision data used. In 3.4 and 3.5, we explain our empirical strategy and state the empirical results respectively. We conclude in 3.6.

3.2 Model

We assume that there is one private good, one pure public good (charity) and $n > 1$ agents. Each agent i has an exogenous income, w_i, and has to decide on the amount of contribution to the public good, g_i. The total amount of public good provision is $G = \sum_{i=1}^{n} g_i$. Let $G_{-i} = \sum_{j \neq i} g_j$ denotes the sum of the contributions by all individuals except i. We adopt the approach of Andreoni (1989, 1990) in incorporating impure altruism and impose inequality aversion in a manner similar to the models of Fehr and Schmidt (1999), and Bolton and Ockenfels (2000).

Denote the net private consumption by $y_i = w_i - g_i$. We assume individuals have identical preferences over the private and public good consumption. This helps to examine the effects of egalitarianism alone. Suppose each individual solves the following problem:

$$\begin{aligned} \max_{y_i, g_i} \; & u(y_i) + v(G) + h(g_i) + f_i(I_i) \\ s.t. \; & y_i + g_i = w_i \\ & 0 \leq g_i \leq w_i \\ & I_i = y_i - \bar{y} \end{aligned} \tag{3.1}$$

where $\bar{y}$ is the average net income, $\frac{W-G}{n}$. We assume $u(.)$, $v(.)$, and $h(.)$ to be strictly increasing, concave and twice differentiable functions representing the utility from private consumption, the utility from public good and the utility from individual's own contributions to the public good (warm-glow), respectively. The term $f_i(I)$ determines the degree of egalitarianism. Agents are assumed to dislike inequality and therefore $f_i(I)$ has a maximum of 0 at $I = 0$ for all individuals i. In addition, f_i is twice differentiable and concave in I. Moreover, $f_i' > 0$ for $I < 0$ and $f_i' < 0$ for $I > 0$.

Assuming an interior equilibrium, the first order condition is:

$$v'(G) + h'(g_i) - (\frac{n-1}{n}) f_i'(I_i) = u'(y_i) \tag{3.2}$$

Each individual contributes to public good until the benefits of contributing is equal to the marginal benefit of an extra consumption.

Definition 1 *Agent i is more egalitarian (or inequality averse) than agent j if $f_i(I) < f_j(I)$ for all $I \in R - \{0\}$.*

Note that, this also implies $|f_i'(I)| > |f_j'(I)|$ for $I \in R - \{0\}$. Next we show that a person's egalitarianism is positively correlated with their voluntary contributions when net income is above the average. However, it is negatively correlated with voluntary contributions when

their net income is below the average.

Proposition 2 *Suppose $w_i = w_j$ and i is more egalitarian than j. Then in equilibrium the following holds:*

i) If $y_j > \bar{y}$ in the equilibrium, then $g_i > g_j$ and $y_i > \bar{y}$.

ii) If $y_j < \bar{y}$ in the equilibrium, then $g_i < g_j$ and $y_i < \bar{y}$.

Proofs are presented in the Appendix A. The intuition is simple. A more inequality averse agent contributes more than a less inequality averse agent with the same income when their net income is higher than the average net income. By contributing more to charities, this agent can decrease the disutility he gets from the inequality. However, an agent with a low level of income decreases the disutility of inequality by decreasing his contribution. At this point, it is worth pointing out that this result does not depend on the form of the inequality aversion measure that we have defined here. In particular, we assumed that agents care about the deviations from the average net incomes. An alternative way to define inequality aversion would also incorporate the disutility from the relative inequalities between each agent in the society. This implies a stronger aversion to inequality since a person with average income will still suffer from inequality unless everyone is perfectly equal. In Appendix B we show that Proposition 1 continues to hold even when we use a different measure - that resembles a Gini coefficient - for egalitarianism. Next, we argue that income has a positive effect on contributions: rich people will contribute more than poor people.

Proposition 3 *Holding the level of egalitarianism constant, an agent contributes more if he has higher income.*

The following proposition states that, in equilibrium, agents who have higher net income than the average have an initial income and contribution higher than agents who have lower net income than the average.

Proposition 4 *If $y_i > \bar{y} > y_j$, then $w_i > w_j$ and $g_i > g_j$.*

The above result implies that there exists an income level w^* such that any agent with an income level $w > w^*$ has $y > \bar{y}$, and any agent with an income level $w < w^*$ has $y < \bar{y}$. The cutoff income level w^* depends on the utility function.

Result: *There exists a cutoff level, w^*, such that individuals with income levels above w^* contribute more to the public good than individuals with income below w^* independent of their levels of egalitarianism.*

To sum up, we find that charitable giving increases with income and inequality aversion has a positive impact on voluntary contributions for wealthy agents but a negative impact on voluntary contributions for poor agents. Next, we describe the data in more detail and test Propositions 1 and 2 empirically.

3.3 Inequality Aversion and Charitable Contributions Data

Empirical literature on the determinants of charitable contributions rely heavily on surveys at the individual level. Similarly, we use the General Social Survey (GSS) data in the United States to test our theoretical results. The GSS for 1996 is the only survey that have questions matching with inequality aversion as well as monetary amount of charitable contributions and personal characteristics. It can be argued that it is better to use more

recent data set but it should be noted that charitable giving in dollar terms are available only in 1996 in GSS data set. We also use the 2002 data set for robustness checks. GSS 2002 data set includes information on, not the monetary amount of giving but, the frequency of charitable giving. The other more recent data sets do not include relevant questions on inequality aversion and monetary amount of charitable giving. The variables used are listed in Table 3.1. We use contributions to charities - the respondent's estimated dollar value contributed including both cash contributions and the cash-value of property - as the dependent variable.[6] We divide the whole sample into three groups (high-income, middle-income and low-income) according to the income of the individual relative to the average income. People that consider themselves above or far above the average are classified as high-income (rich); on average are classified as middle-income; below average and far below average are classified as low-income (poor).[7]

[Insert Table 3.1 here]

Inequality aversion, as used in the model, shows how unhappy the individual becomes observing the income inequality in the society she lives in. It is not easy to come up with a perfect measure for inequality aversion as this question has never been asked in any survey as far as we know. We use some proxies for that reason. INEQUAL1, mentioned in Table 3.1, is a multinomial variable from 1 to 5 that shows whether individuals think there are large income differences in the US. The main reason for using this variable is that this

[6] Although it can be argued that people might not remember the exact provisions or might not be willing to tell the truth about their provisions, we think that these are the drawbacks of all surveys in some level. The actual individual level provision data is available in IRS if charitable contributions are mentioned as deductions. Unfortunately we do not know much about the personal characteristics including the inequality averseness of the individual from that data set.

[7] By using the relative income mentioned by the individual we hope to get a reasonable approximation for the average net income, since the actual average net income cannot be derived from the data set.

question is subjective: a person who is very unhappy because of inequality might find it very high but another person who is not much concerned by income inequality might find it low. Therefore as INEQUAL1 increases, inequality aversion is assumed to rise. Our theory suggests a negative coefficient of INEQUAL1 for poor but a positive coefficient for rich people. Another variable that we use to proxy for inequality aversion is INEQUAL2. This survey question asks whether large income differences are necessary for American prosperity. In the same manner as INEQUAL1, a person who supports large income differences is potentially less averse to inequality. We code this variable so it moves in the same direction as inequality aversion as well. To confirm our empirical results found in 1996, we use the 2002 data set that has questions on altruism. We use INEQUAL3 as a proxy for inequality aversion for the 2002 data set; this question asks the individual's level of concern about others' misfortunes. We assume that people who are concerned about others' misfortunes are potentially more inequality averse.[8] Charitable contributions are not asked in dollar terms in 2002. Instead survey takers are asked how frequently they donate money to a charity.

In the estimation process it is important to control for the government's funding to charities, since government contributions may partially crowd out private provision in charitable giving (i.e.,Clotfelter 1985, Ribar and Wilhelm (2002), Nyborg and Rege (2003), Manzoor and Straub (2005)). Ideally we would use state dummies as controls, unfortunately our data set does not contain information at this level. In GSS we cannot see the state of the individual, but region that the interview was held is mentioned. To capture the different

[8]It should be noted that this is the weakest proxy that we use for inequality aversion in this paper, as the main focus of the question is not income inequality. It can also be argued that income inequality is not necessarily a misfortune but can be a result of different effort levels.

levels of government provision, we used the region dummies in all of the estimations we performed.

[Insert Table 3.2 here]

The summary statistics on the variables are listed in Table 3.2. In 1996 the mean monetary contribution is $666 and the maximum contribution is $52,000. In 2002 we see that on average individuals contributed to a charity 2-3 times a year. The inequality aversion proxies have somewhat similar means. On average people agree that income differences are too large in the US and people do not agree that large income differences are needed for American prosperity. We can also see that in 2002 people are on average disturbed by others misfortunes but not at a great deal.

[Insert Table 3.3 here]

One of our theoretical findings is that, keeping the level of inequality aversion the same, an increase in income increases the monetary contributions. Table 3.3 shows the summary statistics of contributions by income level of the individuals mentioned compared to the average level. It can be seen that as the relative income level rises both the average monetary contributions in 1996 and the average frequency of contributions in 2002 rise.

Before moving to the empirical strategy we would like to mention some concerns about our data set. The first problem is that 1996 GSS data set seems to underestimate the dollar value of charitable giving (the $666 average giving in the GSS is about 1.4 percent of income, but giving is actually 2 percent of income). The percentage of GSS respondents who say they will contribute to charities is around 70 percent similar to other surveys. It

might be argued that GSS data in 1996 is under-measuring the charitable giving of those who contribute to a cause. The second problem about our data set is that the GSS measure of income is categorical and top-coded at $75,000. Measuring income above average, there are only three categories as the average household income in 1996 was around $47,000 in 1996 dollars. This might be a problem if we consider the fact that most of the charitable giving is done by the individuals above average income. As well as the problems listed above it is worth to mention that the GSS income measure is, of course, only measuring current-year income. The GSS, like other several important surveys, has no data that can be used to attempt to control for permanent income or wealth of the individual.

The data set used in the empirical estimations has 828 observations in 1996 data. Mainly 1,444 individuals were asked about their giving in 1996. In the empirical analysis we dropped respondents who had missing data in any of the 15 questions (contributions to health, human, education, youth etc.) about amounts given. 424 respondents had missing amount responses ("don't know" or "no answer") in at least one of these 15 amounts. The dollar contributions can be derived for 1,019 individuals.[9] Also in the empirical estimations we control for income, education, religious affiliation, marital status etc. which results in further loss of data that has missing information in any of the independent variables used.

[9]There is one observation that mentions a dollar giving of 28,000, although the individual is a low-income individual. This observation is excluded.

3.4 Empirical Strategy

The regression equation, with inequality aversion as the key variable of concern, can be written as follows:

$$PROVISION_i = \max[0, \alpha AVERSION_i + \Lambda PERSONAL_i + \varepsilon_i] \tag{3.3}$$

where $PROVISION_i$ is the private provision of the public good of individual i. $AVERSION_i$ is the variable of interest and denotes the degree of inequality aversion of individual i. $PERSONAL_i$ is the vector of other personal characteristics that might effect the public good provision like income level, gender, number of children, age, education level, being religious. We also include region dummies to capture the total public good provision in the area lived.

As mentioned in Andreoni *et. al* (1996) the most common empirical models in charitable giving literature regress log contributions against the log of income and other personal characteristics such as age, marital status and education. For some economic agents the optimal choice will be the corner solution, namely $PROVISION_i = 0$. Since $PROVISION_i$ is censored at zero, meaning a substantial portion of the population gives nothing and nobody gives less than zero, using ordinary least squares to estimate the regression will produce biased estimates. Hence, following Reece (1979), we use Tobit estimation in the main regressions. This is consistent with most of the literature on charitable giving (Van Slyke and Brooks, 2005). However, since the consistency of coefficient estimates derived from Tobit depends upon the assumption of censored normality and homogeneity, it is important to check these assumptions. Following Greene and McClelland (2001) and Wilhelm(2006), we

compare the Tobit estimates to the estimates derived from the symmetrically censored least squares estimator and censored least absolute deviations. Using a Hausman-type test, we found that Tobit coefficient estimates are not systematically different from the symmetrically censored least squares estimates and censored least absolute deviations. Therefore, we found no evidence of inconsistency in Tobit estimations.

In charitable contributions like other corner solution applications, we are interested in probabilities or expectations involving the dependent variable. Assume that $y = PROVISION_i$ and

$$x = \begin{bmatrix} AVERSION_i \\ \\ PERSONAL_i \end{bmatrix}, \ \beta = \begin{bmatrix} \alpha \\ \\ \Lambda \end{bmatrix}, \text{ and } \varepsilon_i \sim N(0, \sigma^2).$$

Following Wooldridge (2002), we report the partial effects on $E(y|x, y > 0)$ and $E(y|x)$.

$$E(y|x, y > 0) = x\beta + \sigma \left[\frac{\phi(x\beta/\sigma)}{\Phi(x\beta/\sigma)} \right] \tag{3.4}$$

where $\phi(.)$ is the normal density and $\Phi(.)$ is the cumulative normal distribution. Consequently the partial effects with respect to $E(y|x, y > 0)$ can be written as follows for continuous variables:

$$\frac{\partial E(y|x, y > 0)}{\partial x_j} = \beta_j \left\{ 1 - \lambda(\frac{x\beta}{\sigma}) \left[\frac{x\beta}{\sigma} + \lambda(\frac{x\beta}{\sigma}) \right] \right\} \tag{3.5}$$

where $\lambda(h) = \dfrac{\phi(h)}{\Phi(h)}$ is called the inverse Mills ratio.

It should be noted that the partial effects can be written as above only when the variable is continuous. For discrete variables, like inequality aversion in our model, we can derive

the partial effects as the following:

$$\frac{\Delta E(y|x, y > 0)}{\Delta x_j} = \frac{E(y|x + \Delta x_j, y > 0) - E(y|x, y > 0)}{\Delta x_j} \tag{3.6}$$

For example, for discrete variables like the dummy variables included as personal characteristics (gender, race, etc.) we need to find the difference in $E(y|x, y > 0)$ with $x_i = 1$ and $x_i = 0$. For inequality aversion the discrete change can be derived for changes from 1 to 2, 2 to 3, 3 to 4 and 4 to 5.

We can derive the expectations not conditional on y being larger than 0 as $E(y|x) = \Phi(\frac{x\beta}{\sigma})x\beta + \sigma\phi(\frac{x\beta}{\sigma})$. The partial effects with respect to $E(y|x)$ for continuous variables is given by the following:

$$\frac{\partial E(y|x)}{\partial x_j} = \Phi(\frac{x\beta}{\sigma})\beta_j \tag{3.7}$$

For discrete variables the partial effects will be derived as the following:

$$\frac{\Delta E(y|x)}{\Delta x_j} = \frac{E(y|x + \Delta x_j) - E(y|x)}{\Delta x_j} \tag{3.8}$$

As a robustness check, we also use 2002 data set, where we do not have monetary contributions but instead use a multinomial variable for charitable giving. As the Tobit model is not appropriate for ordered responses (Wooldridge, 2002), we employ ordered logit estimations for private provision of public goods (frequency of charitable giving) using the equation (3.3).[10] Just like the Tobit estimations, the coefficients in the ordered logit esti-

[10] Charitable contributions are ordered according to the frequency of giving, therefore we use Ordered

mations do not show the true magnitude of the effect. However, the signs of the coefficients are still valid (when there is no interaction term).[11]

In our empirical analysis, we divide the total population as low-income, middle-income and high-income and conduct the Tobit and Ordered Logit estimations. This generates an environment in which it is easy to see if inequality aversion has the expected effect on different income groups. Clearly, dividing the population into groups comes with a cost; we lose power. Alternatively we performed the estimations using the whole data set and added an interaction term of income and inequality aversion. Since our qualitative results remain the same, we do not report the findings.[12]

3.5 Empirical Results

Using the Tobit Estimations, we show that inequality aversion has significant effects on charitable contributions.[13] Table 3.4 below shows that voluntary giving is increasing in the degree of inequality aversion for individuals that are wealthier than the average; however, the sign of the effect is reversed for individuals that are poorer than the average. Table 3.4 shows that the coefficient for INEQUAL1 is positive for rich and negative for poor as the theory suggests. Partial effects can be seen in Table 3.5. Conditional on charitable contributions being positive a one point increase in the perception of income inequality in US will increase

Logit Estimation (OLE) rather than Multinomial Logit Estimation.

[11] As our concern is mainly the signs of the coefficients, we do not report the partial effects in the ordered logit estimations.

[12] When an interaction term is introduced to the nonlinear Tobit and Ordered Logit estimations the signs of the coefficients, as well as the significance of the interaction terms, do not reflect the true sign and significance of the partial effects (Ai and Norton, 2001). The results are available from the authors upon request.

[13] One may argue that voluntary giving may have an impact on inequality aversion as well, which creates simultaneity problem. However, we believe that inequality aversion is an exogenous individual characteristic and is not affected by voluntary contributions.

the contributions by 20% for rich individuals and will decrease the contributions by 20% to 22% for poor. When we consider all income levels we find that a one point increase in a person's perception that income inequality in the US is too large will increase their contributions by 11% to 20% generally. This implies that if perceptions of individuals are changed towards being more inequality averse (for example, through education), then total charitable giving will increase.[14]

[Insert Table 3.4 & 3.5 here]

The effect of inequality aversion on charitable giving is definitely very large in dollar terms. We can make a very rough calculation: assume that each individual's inequality aversion is increased by 1 unit in the US. On average 1 unit increase in inequality aversion results in approximately 16% increase in charitable giving. As mentioned at the beginning of the paper, charitable giving was nearly 187 billion dollars in 2005. The increase in inequality aversion will increase total charitable giving, by a very rough calculation, nearly 29.92 billion dollars which is definitely a considerable amount.

Another finding presented in Table 3.5 is that a 10% increase in income will result in a nearly 12% increase in charitable giving in general, which supports our theoretical finding that, keeping inequality aversion constant, wealthier individuals contribute more. The effect of income in charitable giving is even higher for the rich. A 10% increase in income increases charitable giving by nearly 11% for low-income individuals and 14% for high-income individuals.[15] In all cases income has a significant positive effect on charitable

[14] From the data set we do not know the tax rates individuals face. Although this may have a positive bias on the coefficient of the income, we think that the coefficient of inequality aversion is still estimated consistently as it is very unlikely that the price of giving and the degree of inequality aversion is correlated.

[15] One has to be careful while interpreting this result. Individuals with higher incomes are in higher tax-

giving as the literature suggests. Age seems to have a positive effect on charitable giving in general, as suggested in the literature (Clotfelter, 2002); but age has no significant effect when we divide the groups as rich and poor. In all of the regressions education has a significant and positive effect on charitable giving. Another finding that is also consistent with the previous literature is that strength of religious affiliation has a significantly positive effect on charitable giving, and the effect is higher among the poor. Being married has a positive effect on charitable giving in general. However, being female does not have a significant effect on giving in general. The effect of being female is surprisingly negative and significant for people below average income but significant and positive for people above the average. Women become more generous in voluntary giving only when their income is above average.[16] It has also been argued in the literature that ethnicity has a significant effect on giving (Van Slyke and Brooks, 2005). Being black has a negative and significant effect on charitable giving in general, and for the poor. It has a negative but insignificant effect for rich individuals. Among rich people the individuals that are neither white nor black contribute significantly less. We do not find any significant relation between the number of children and voluntary giving.

[Insert Table 3.6 and 3.7 here]

At this junction, it is important to note that being left wing and being inequality averse are different concepts, although they are correlated. In GSS people are also asked about

brackets. Therefore the price of giving is lower for wealthy individuals. This may impose an upward bias for the coefficient of income, since we are not controlling for the price of giving. However, even when price is controlled for, the empirical literature finds a positive elasticity of income. Clotfelter (2002) finds income elasticity between 0.4 and 0.8 when controlling for the price of giving.

[16] Another interesting finding is presented by Andreoni and Vesterlund (2001). The authors show that men are more generous than women when it is cheap to give, and that women are more generous than men when it is more expensive to give.

their political ideology. The correlation between our proxies for inequality aversion and being liberal is 0.18 and 0.12 for INEQUAL1 and INEQUAL2 respectively. We find that people who identify themselves as liberals tend to give less to the charities. This effect is always significantly negative regardless of their income levels, i.e., effect is negative even if we look at individuals with incomes higher than average.[17] This finding is consistent with the results of Brooks and Lewis (2001). Brooks and Lewis find that individuals that are more conservative in their political and ideological orientation, are more likely to give to charitable organizations than individuals who identified their political orientation as liberal.

One may still wonder if our proxies for inequality aversion have any impact on contributions of agents that have average income. Theory predicts that the degree of inequality aversion should not matter for the middle-income class. In order to support our model we also repeat our regressions for the middle-income class (not shown). We find that a point rise in INEQUAL1 (INEQUAL2) increases contributions by 18% (8%). However, the effect is not significant ($p = 0.11$ for INEQUAL1 and $p = 0.57$ for INEQUAL2).

Robustness check using the 2002 data partially supports our theoretical findings. As Table 3.7 suggests there is a positive and significant relation between the inequality aversion proxy and the frequency of giving. The effect is again positive and significant for the rich. Although we find that inequality aversion has a negative effect on charitable giving for the poor, the effect is not very significant.[18] Similarly, we repeat the regression for middle-income. Frequency of giving decreases by 0.4% in the degree of inequality aversion. However,

[17] Results are available from the authors upon request.

[18] The reason for not finding results as powerful as the other regressions has two main reasons: First we have been using the frequency of contributions rather than the dollar contributions. A person who frequently makes a charitable contribution is not necessarily the one with higher contributions. The other reason that we talked about before is that the inequality aversion variable shows the unhappiness towards others misfortunes and some people might not consider income inequality as a misfortune of poor individuals.

consistent with the model, the effect is not significant ($p = 0.6$).

In addition, we would like to investigate whether inequality aversion has a similar impact on charitable contributions independent of the motivations to give. In our previous analysis, we did not distinguish between charitable giving to different institutions. Rather we only consider the total amount of contributions to the charities. Regardless of the sector (health, education, religious, youth, political etc.) every dollar of charitable giving made has the same effect on utility in our model. In order to see whether the impact of inequality aversion on charitable giving differs with motivations, we roughly group the charitable contributions into two: altruistic and non-altruistic contributions.

We consider total charitable contributions to health, education, human services, environment, public society benefit, culture and humanities, youth development, private and community foundations, and international/foreign as altruistic contributions. Non-altruistic contributions, as we define them, mainly include charitable contributions that the individual gets direct benefit from. Non-altruistic contributions are considered to be contributions to religious organizations, recreation/adults, arts, work related organizations, political organizations or campaigns.[19] Table 3.8 - Table 3.11 show that there are not crucial differences in different sectors. When INEQUAL1 and INEQUAL2 are used as a proxy for inequality aversion, we replicate our previous results for both altruistic and non-altruistic contributions.

In addition to the monetary contributions data, GSS also has data on "volunteering." This allows us to examine the relationship between volunteering and inequality aversion.

[19] We do not include "others" in neither the altruistic nor the non-altruistic contributions since it is not clear where it belongs.

Volunteering has an opportunity cost and therefore means forgone earnings; however, volunteering may not have a direct impact on individual's income.[20] Therefore, our hypothesis is that, we should not observe a strong relationship between volunteering and inequality aversion as we have observed for monetary contributions and inequality aversion. In order to test our hypothesis, we did empirical estimations using the total number of hours that an individual volunteer as the dependent variable instead of monetary contributions to charities. We find a positive and significant effect of inequality aversion on the total number of hours volunteered for people above average income but for people below average income we do not observe a significant relationship between inequality aversion and hours of volunteering. In the same manner logit estimations have been performed for the effect of inequality aversion on decision to volunteer or not. We do not find a significant relationship between decision to volunteer or not and inequality aversion.[21]

3.6 Conclusion

We live in a world that is not fair in many aspects. Even children recognize the simple fact of life that people can afford different things with the different income levels that they have. Although some of us are very concerned about income differences, some of us accept them silently and some of us are even happy about them. We asked a moral question that has economic consequences: "Does inequality aversion affect private provision of public goods? If yes, is the effect same for the high-income and low-income groups?" Despite the many factors that have been shown to determine the level of charitable giving, we found new

[20] Individuals who substitute leisure with volunteering (or vice-versa) does not change their income.

[21] We find that the effect of inequality aversion change sign, from positive to negative, for people above average and below average income but the effect is not significant for any groups.

evidence that dislike towards inequality has significant effects on individual giving and has different effects among the low-income and high-income groups. The main theoretical and empirical findings of this paper can be summarized as follows: High-income individuals contribute more to the public good as they get more inequality averse (egalitarian); in contrary, low-income individuals contribute less to the public good as they get more inequality averse (egalitarian). We have also shown that wealthier individuals contribute more, keeping the degree of egalitarianism constant.

3.A Appendix: Proofs

Proof of Proposition 1. i) It is trivial to see the first inequality by inspecting the first order condition. To show the second inequality, assume $y_i \leq \bar{y}$. The following holds:

$$0 < h'(g_j) - h'(g_i) - (\frac{n-1}{n})[f_j'(I_j) - f_i'(I_i)] = u'(y_j) - u'(y_i) \tag{3.9}$$

However, this is a contradiction since $u'(y_j) < u'(y_i)$.

ii) Similarly the first inequality is trivial. Now suppose $y_i \geq \bar{y}$. The following holds:

$$0 > h'(g_j) - h'(g_i) - (\frac{n-1}{n})[f_j'(I_j) - f_i'(I_i)] = u'(y_j) - u'(y_i) \tag{3.10}$$

However, this contradicts to $u'(y_j) > u'(y_i)$. ■

Proof of Proposition 2. Trivial. ■

Proof of Proposition 3. Since both of them are contributors,

$$u'(y_i) - h'(g_i) + (\frac{n-1}{n})f_i'(I_i) = u'(y_j) - h'(g_j) + (\frac{n-1}{n})f_j'(I_j) \tag{3.11}$$

Since $y_i > y_j$, $u'(y_i) < u'(y_j)$. Therefore,

$$h'(g_i) - (\frac{n-1}{n})f_i'(I_i) < h'(g_j) - (\frac{n-1}{n})f_j'(I_j) \tag{3.12}$$

We know that $I_i > 0 > I_j$.

$$0 < -(\frac{n-1}{n})[f_i'(I_i) - f_j'(I_j)] < h'(g_j) - h'(g_i) \tag{3.13}$$

Hence $g_i > g_j$. Since $y_i > y_j$, $w_i - w_j > 0$. ■

3.B Appendix: Another Measure for Inequality Aversion

The inequality aversion measure we used in the paper depends on the deviations from the average income. However, it is not sensitive to how unequal the society is. In this section, through an example, we demonstrate that the qualitative results do not depend on the specification. Suppose each individual now solves the following optimization problem:

$$\begin{aligned} &\max_{y_i, g_i} u(y_i) + v(G) + h(g_i) + f_i(y_i) \\ &s.t.\ y_i + g_i = w_i \\ &0 \leq g_i \leq w_i \end{aligned} \tag{3.14}$$

where

$$f_i(y_i) = -a_i \sum_s \sum_t (y_s - y_t)^2.$$

We continue to assume $u(.)$, $v(.)$, and $h(.)$ to be strictly increasing, concave and twice differentiable functions representing the utility from private consumption, the utility from public good and the utility from individual's own contributions to the public good (warm-glow), respectively. The term a_i determines the degree of egalitarianism. Agents are assumed to dislike inequality and therefore $a_i \geq 0$ for all individuals i.

Assuming an interior equilibrium, the first order condition is:

$$-u'(y_i) + v'(G) + h'(g_i) - 4a_i \sum_{s \neq i} (y_s - y_i) = 0 \tag{3.15}$$

since

$$\sum_s \sum_t (y_s - y_t)^2 = \sum_{s \neq i} (y_s - y_i)^2 + \sum_{t \neq i} (y_i - y_t)^2 + \sum_{s \neq i} \sum_{t \neq i} (y_s - y_t)^2$$

Proposition 5 *Suppose $w_i = w_k$ and i is more egalitarian than k ($a_i > a_k$).. Then in equilibrium the following holds:*

i) If $y_i > \bar{y}$ in the equilibrium, then $g_i > g_k$,

ii) If $y_i < \bar{y}$ in the equilibrium, then $g_i < g_k$,

iii) If $y_i = \bar{y}$ in the equilibrium, then $g_i = g_k$,

where $\bar{y} = \frac{\sum_{s \neq i} y_s}{n-1}$.

Proof. We give the proof of part i. The rest is similar.

Suppose $y_i > \bar{y}$. But $g_i \leq g_k$. This implies that $y_k \leq y_i$. Therefore, the following has to hold:

$$\sum_{s \neq i} (y_s - y_i) \leq \sum_{j \neq k} (y_j - y_k).$$

Since $\sum_{s \neq i} (y_s - y_i) < 0$, we have

$$a_i \sum_{s \neq i} (y_s - y_i) < a_k \sum_{j \neq k} (y_j - y_k).$$

Therefore,

$$u'(y_k) - h'(g_k) < u'(y_i) - h'(g_i)$$

or

$$u'(y_k) - u'(y_i) < h'(g_k) - h'(g_i)$$

However, this contradicts $g_i \leq g_k$ and $y_k \leq y_i$. ■

Table 3.1: Data for Estimating the Voluntary Provisions Model

Charitable Contributions	
CONTRIBUTE1[a]	Respondent's estimated dollar value contributed, including both cash contributions and the cash-value of property contributions last year[1] (0-99995$)
CONTRIBUTE2[a]	Respondent's frequency of charitable giving Not at all in the past year=0, Once in the past year=1, At least 2 or 3 times in the past year=2, Once a month=3, Once a week=4, More than once a week=5
CONTRIBUTE3[a]	Respondents estimated dollar value of *altruistic* contributions.[2]
CONTRIBUTE4[a]	Respondents estimated dollar value of *non-altruistic* contributions (where respondent gets direct benefit from consumption of the public good).[3]
Inequality Aversion	
INEQUAL1[b]	Do you agree or disagree: Differences in income in America are too large. Strongly Disagree = 1, Disagree = 2, Neither agree nor disagree = 3, Agree = 4, Strongly Agree = 5[4]
INEQUAL2[b]	Do you agree or disagree: Large differences in income are necessary for America's prosperity. Strongly Agree = 1, Agree = 2, Neither agree nor disagree = 3, Disagree = 4, Strongly Disagree = 5
INEQUAL3[b]	How well it describes you: Other people's misfortunes do not usually disturb me a great deal. Describes very well = 1 2 3 4 Does not describe me very well = 5
Personal Characteristics	
Female[c]	Respondent is female or not, dummy variable
Age[d]	Respondent's age
Income[d]	Respondent's family income in the last year (0-100000 and more)
Religious[b]	Respondent's strength of affiliation
Black[c]	Respondent's race being black
Other[c]	Respondent's race being other than black and white
Education[b]	Respondent's year of education
Number of Children[a]	Respondent's number of children
Married[c]	Respondent's being married
Separated[c]	Respondent's being separated
Divorced[c]	Respondent's being divorced
Widowed[c]	Respondent's being widowed
Region Dummies[c]	Respondent's region in US New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, Pacific

[a] Measured as natural logarithm plus one, [b] Multinomial Variable, [c] Dummy Variable, [d] Measured as natural logarithm

[1] We derived this variable as total contributions by adding up the different sectors that are asked in the survey: health, education, religious organizations, human services, environment, public/society benefit, recreation/adults, arts, culture and humanities, work related organizations, political organizations or campaigns, youth development, private and community foundations, international/foreign, informal-alone-not-for-pay and others.

[2] We derived this variable by adding up the charitable giving in the following sectors: health, education, human services, environment, public/society benefit, culture and humanities, youth development, private and community foundations, international/foreign.

[3] We derived this variable by adding up the charitable giving in the following sectors: religious organizations, recreation/adults, arts, work related organizations, political organizations or campaigns.

[4] The variable in GSS (INCGAP) is increasing as the inequality aversion decreases. In order to avoid confusion we generated a new variable that moves in the same direction as inequality aversion

Table 3.2: Summary Statistics

	Year=1996			
Variable	*Mean*	*Std. Dev.*	*Min*	*Max*
CONTRIBUTE1	665.83	2596.17	0	52000
CONTRIBUTE3	210.81	1136.00	0	21000
CONTRIBUTE4	455.02	1769.87	0	38000
INEQUAL1	3.73	1.27	1	5
INEQUAL2	3.52	1.29	1	5
Female	0.52	0.50	0	1
Number of Children	1.77	1.74	0	8
Married	0.47	0.50	0	1
Separated	0.07	0.25	0	1
Divorced	0.18	0.38	0	1
Widowed	0.05	0.21	0	1
Age	42.77	16.17	18	89
Black	0.14	0.34	0	1
Other	0.05	0.22	0	1
Education (years)	13.46	2.81	3	20
Being Religious	1.96	1.00	0	3
Income	39615.92	31412.46	500	115514
Number of Observations: 828				
	Year=2002			
CONTRIBUTE2	2.43	1.09	1	5
INEQUAL3	2.67	1.23	0	4
Female	0.50	0.50	0	1
Number of Children	1.86	1.78	0	8
Married	0.43	0.50	0	1
Separated	0.08	0.27	0	1
Divorced	0.16	0.36	0	1
Widowed	0.04	0.20	0	1
Age	45.56	17.56	18	99
Black	0.16	0.37	0	1
Other	0.07	0.26	0	1
Education (years)	13.23	3.08	0	20
Being Religious	1.97	1.03	0	3
Income	15.39	5.68	1	23
Number of Observations: 790				

Table 3.3: Summary Statistics of Contributions by Income

		Year=1996, CONTRIBUTE1				
		Obs.	*Mean*	*Std. Dev.*	*Min*	*Max*
INCOME*	FAR BELOW AVERAGE	60	135.167	412.363	0	2200
	BELOW AVERAGE	264	210.106	558.308	0	5600
	AVERAGE	489	392.620	986.228	0	11700
	ABOVE AVERAGE	173	1605.150	3547.898	0	30000
	FAR ABOVE AVERAGE	23	21668.420	81642.420	0	52000
		Year=2002,CONTRIBUTE2				
		Obs.	*Mean*	*Std. Dev.*	*Min*	*Max*
INCOME*	FAR BELOW AVERAGE	58	2.000	0.898	1	5
	BELOW AVERAGE	211	2.227	0.959	1	5
	AVERAGE	356	2.371	1.099	1	5
	ABOVE AVERAGE	144	2.944	1.095	1	5
	FAR ABOVE AVERAGE	21	3.000	1.140	1	5

* Income used is the income level mentioned by the individual as far above average, above average, average, below average and far below average.

Table 3.4: Tobit Estimation Results under Inequality Aversion (1996) - I

Dependent variable: Total Private Charitable Contributions ($), CONTRIBUTE1[a]
INEQUAL1: Differences in income in America are too large, 1(Strongly disagree) – 5 (Strongly agree).

	(1) Total		(2) Low Income		(3) High Income	
Inequality Aversion:	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***
INEQUAL1[b]	0.165**	0.079	-0.256**	0.117	0.242**	0.112
Personal Characteristics:						
Female[c]	-0.011	0.274	-0.950*	0.558	0.885*	0.480
Age[d]	3.289***	1.210	1.547	2.347	0.728	2.446
Income[d]	1.329***	0.195	0.961***	0.319	1.524***	0.376
Being Religious[b]	0.873***	0.145	1.708***	0.280	0.923***	0.270
Ethnicity						
Black[c]	-1.023**	0.465	-1.925**	0.808	-1.152	1.333
Other[c]	-1.038	0.695	0.412	1.211	-2.592**	1.291
Education[b]	0.289***	0.053	0.350***	0.113	0.182*	0.102
Number of Children[a]	-0.221	0.293	0.688	0.600	-0.540	0.584
Marital Status						
Married[c]	1.192***	0.450	-1.197	0.923	0.674	0.828
Separated[c]	0.687	0.792	-1.045	1.181	1.667	1.717
Divorced[c]	0.326	0.502	-0.980	0.895	0.224	0.900
Widowed[c]	0.353	0.736	0.113	1.404	0.556	2.022
Region Dummies[c]	Yes		Yes		Yes	
Number of Observations	828		261		172	
Wald Chi2	262.01		105.86		86.35	
Prob>Chi2	0.000		0.000		0.000	
Log-Pseudo Likelihood	-1713.077		-475.258		-382.983	

[a] Measured as natural logarithm plus one, [b] Multinomial Variable, [c] Dummy Variable, [d] Measured as natural logarithm
Robust standard errors are used.
*Significant at 10%, **significant at 5%, ***significant at 1%

Table 3.5: Partial Effects of Tobit Estimation under Inequality Aversion (1996)

Dependent variable: Total Private Charitable Contributions ($), CONTRIBUTE1[a]

INEQUAL1: Differences in income in America are too large, 1(Strongly disagree) – 5 (Strongly agree).

Inequality Aversion:	**(1) Total**		**(2) Low Income**		**(3) High Income**	
INEQUAL1[b]	**E(y|y>0,x)**	**E(y|x)**	**E(y|y>0,x)**	**E(y|x)**	**E(y|y>0,x)**	**E(y|x)**
1 to 2	0.119	0.057	-0.201	-0.229	0.206	0.108
2 to 3	0.121	0.052	-0.206	-0.213	0.204	0.101
3 to 4	0.209	0.047	-0.213	-0.194	0.202	0.102
4 to 5	0.211	0.043	-0.221	-0.174	0.199	0.121
Personal Characteristics:						
Female[c]	0.001	0.001	-0.581	-0.408	0.842	0.708
Age[d]	2.536	1.830	0.937	0.657	0.614	0.579
Income[d]	1.210	1.115	1.111	0.957	1.451	1.308
Being Religious[b]	0.673	0.486	1.054	0.739	0.886	0.734
Ethnicity						
Black[c]	-0.757	-0.540	-1.050	-0.748	-0.973	-0.865
Other[c]	-0.767	-0.546	0.263	0.185	-2.304	-1.794
Education[b]	0.227	0.164	0.221	0.155	0.177	0.144
Number of Children[a]	-0.173	-0.125	0.424	0.298	-0.498	-0.429
Marital Status						
Married[c]	0.931	0.674	-0.739	-0.521	0.570	0.533
Separated[c]	0.554	0.405	-0.606	-0.428	1.397	1.415
Divorced[c]	0.265	0.192	-0.578	-0.407	0.158	0.179
Widowed[c]	0.285	0.207	0.083	0.058	0.312	0.454
Region Dummies	Yes		Yes		Yes	

[a] Measured as natural logarithm plus one, [b] Multinomial Variable, [c] Dummy Variable, [d] Measured as natural logarithm
Robust standard errors are used.
*Significant at 10%, **significant at 5%, ***significant at 1%.

Table 3.6: Tobit Estimation Results under Inequality Aversion (1996) - II

Dependent variable: Total Private Charitable Contributions ($), CONTRIBUTE1 [a]

INEQUAL2: Large differences in income are necessary for America's prosperity: 1 (Strongly Agree) - 5(Strongly Disagree).

	(1) Total		(2) Low Income		(3) High Income	
Inequality Aversion:	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***
INEQUAL2 [b]	0.260***	0.105	-0.220**	0.109	0.523***	0.202
Personal Characteristics:						
Female [c]	-0.025	0.272	-0.993*	0.556	0.889*	0.478
Age [d]	3.308***	1.207	2.102	2.350	0.649	2.470
Age square [d]	0.000	0.000	0.000	0.001	0.000	0.001
Income [b]	1.346***	0.197	0.905***	0.320	1.445***	0.388
Being Religious [b]	0.888***	0.144	1.701***	0.279	0.938***	0.266
Ethnicity						
Black [c]	-0.989**	0.458	-1.720**	0.774	-1.052	1.343
Other [c]	-1.059	0.689	0.397	1.210	-2.610**	1.289
Education [b]	0.297***	0.053	0.363***	0.113	0.187*	0.103
Number of Children [a]	-0.251	0.288	0.576	0.589	-0.527	0.587
Marital Status						
Married [c]	1.318***	0.440	-0.889	0.908	0.605	0.822
Separated [c]	0.914	0.778	-0.792	1.180	1.451	1.683
Divorced [c]	0.414	0.494	-0.790	0.886	0.167	0.908
Widowed [c]	0.450	0.796	0.319	1.408	0.328	1.952
Region Dummies [c]	Yes		Yes		Yes	
Number of Observations	828		261		172	
Wald Chi2	151.15		66.75		87.54	
Prob>Chi2	0.000		0.000		0.000	
Log-Pseudo Likelihood	-1374.4		-329.48		-340.70	

[a] Me asured as natural logarithm plus one, [b] Multinomial Variable, [c] Dummy Variable, [d] Measured as natural logarithm

Robust standard errors are used.

*Significant at 10%, **significant at 5%, ***significant at 1%

Table 3.7: Ordered Logit Estimation Results under Inequality Aversion (2002)

Dependent variable: Frequency of Charitable Contributions, CONTRIBUTE2 [a]

INEQUAL3: Other people's misfortunes do not usually disturb me a great deal, 1 (Describes me very well) – 5 (Does not describe me well)

	(1) Total		*(2) Low Income*		*(3) High Income*	
Inequality Aversion:	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***
INEQUAL3 [b]	0.071*	0.041	-0.064	0.091	0.289***	0.107
Personal Characteristics:						
Female [c]	-0.179	0.136	-0.100	0.250	-0.128	0.336
Age [d]	0.032	0.023	0.004	0.040	0.140***	0.057
Income [b]	0.065***	0.014	0.058**	0.026	0.149***	0.058
Being Religious [b]	0.212***	0.068	0.272***	0.123	0.246	0.155
Ethnicity						
Black [c]	-0.091	0.197	0.135	0.307	-0.352	0.748
Other [c]	-0.522*	0.286	-0.324	0.514	-0.919	0.714
Education [b]	0.064***	0.023	0.007	0.044	0.021	0.062
Number of Children [a]	0.053	0.054	0.020	0.076	0.170	0.110
Marital Status						
Married [c]	-0.184	0.218	0.212	0.373	-0.448	0.575
Separated [c]	-0.677**	0.346	-0.691	0.624	-1.275	0.895
Divorced [c]	-0.334	0.247	-0.139	0.378	-0.077	0.669
Widowed [c]	-0.329	0.316	-0.473	0.544	-0.227	1.119
Region Dummies [c]	Yes		Yes		Yes	
Constant	Yes		Yes		Yes	
Number of Observations	789		268		165.000	
Wald Chi2	193.630		46.630		56.320	
Prob>Chi2	0.000		0.002		0.000	
Log-Pseudo Likelihood	-1067.948		-324.036		-204.569	
Pseudo R-square	0.063		0.067		0.121	

[a]M easured as natural logarithm plus one, [b]Multinomial Variable, [c]Dummy Variable, [d]Measured as natural logarithm
Robust standard errors are used.
*Significant at 10%, **significant at 5%, ***significant at 1%

Table 3.8: Tobit Estimation for Altruistic Contributions (1996) - I

Dependent variable: Altruistic Charitable Contributions ($): CONTRIBUTE3[a]

INEQUAL1: Differences in income in America are too large, 1(Strongly disagree) – 5 (Strongly agree).

	(1) Total		(2) Low Income		(3) High Income	
Inequality Aversion:	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***
INEQUAL1[b]	0.040	0.108	-0.372***	0.1290.394	***	0.125
Personal Characteristics:						
Female[c]	0.137	0.355	-0.075	0.784	0.678	0.589
Age[d]	2.196***	0.600	2.656**	1.247	0.604	1.126
Income[d]	1.377***	0.266	0.764***	0.4861.906	***	0.553
Being Religious[b]	0.504***	0.186	0.984***	0.3761.185	***	0.314
Ethnicity						
Black[c]	-1.841***	0.629	-3.345***	1.282	-2.572*	1.529
Other[c]	-1.881**	0.949	0.986	1.661	-3.259***	1.094
Education[b]	3.777***	0.968	3.946**	1.8314.119	***	1.637
Number of Children[a]	-0.212	0.364	0.142	0.778	-0.503	0.698
Marital Status						
Married[c]	0.327	0.597	-0.945	1.302	-1.076	0.965
Separated[c]	-0.315	0.883	-1.852	1.646	0.657	1.393
Divorced[c]	0.460	0.655	-0.163	1.258	-0.538	1.046
Widowed[c]	0.150	1.013	-0.537	1.633	4.753**	2.404
Region Dummies[c]	Yes		Yes		Yes	
Constant	Yes		Yes		Yes	
Number of Observations	828		261		172	
Wald Chi2	152.62		60.38		83.65	
Prob>Chi2	0.000		0.000		0.000	
Log-Pseudo Likelihood	-1393.25		-333.67		-344.71	

[a]Mea sured as natural logarithm plus one, [b]Multinomial Variable, [c]Dummy Variable, [d]Measured as natural logarithm
Robust standard errors are used.
*Significant at 10%, **significant at 5%, ***significant at 1%

Table 3.9: Tobit Estimation for Altruistic Contributions (1996) - II

Dependent variable: Altruistic Charitable Contributions ($): CONTRIBUTE3[a]

INEQUAL2: Large differences in income are necessary for America's prosperity: 1 (Strongly Agree) -- 5(Strongly Disagree).

	(1) Total		*(2) Low Income*		*(3) High Income*	
Inequality Aversion:	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***
INEQUAL2[b]	0.351***	0.139	-0.287*	0.155	0.519***	0.213
Personal Characteristics:						
Female[c]	0.092	0.352	-0.230	0.774	0.720	0.595
Age[d]	2.134***	0.595	2.450**	1.246	1.061	1.163
Income[d]	1.418***	0.272	0.742**	0.375	1.824***	0.552
Being Religious[b]	0.525***	0.184	0.977***	0.372	1.190***	0.312
Ethnicity						
Black[c]	-1.831***	0.632	-3.111**	1.317	-2.306	1.547
Other[c]	-1.920**	0.938	0.749	1.643	-3.264***	1.168
Education[b]	3.518***	0.977	3.911**	1.910	3.826***	1.747
Number of Children[a]	-0.186	0.364	0.172	0.783	-0.658	0.715
Marital Status						
Married[c]	0.279	0.590	-0.631	1.297	-1.133	0.979
Separated[c]	-0.204	0.876	-1.397	1.632	0.276	1.435
Divorced[c]	0.414	0.650	0.013	1.265	-0.636	1.074
Widowed[c]	0.153	1.000	-0.426	1.642	4.231**	2.212
Region Dummies[c]	Yes		Yes		Yes	
Constant	Yes		Yes		Yes	
Number of Observations	828		261		172	
Wald Chi2	151.77		57.05		82.43	
Prob>Chi2	0.000		0.000		0.000	
Log-Pseudo Likelihood	-1390.04		-333.98		-345.37	

[a] Measured as natural logarithm plus one, [b] Multinomial Variable, [c] Dummy Variable, [d] Measured as natural logarithm

Robust standard errors are used.

*Significant at 10%, **significant at 5%, ***significant at 1%

Table 3.10: Tobit Estimation for Non-Altruistic Contributions (1996) - I

Dependent variable: Non-Altruistic Charitable Contributions ($): CONTRIBUTE4[a]

INEQUAL1: Differences in income in America are too large, 1(Strongly disagree) – 5 (Strongly agree)

	(1) Total		(2) Low Income		(3) High Income	
Inequality Aversion:	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***
INEQUAL1[b]	0.134	0.155	-0.449***	0.184	0.349***	0.179
Personal Characteristics:						
Female[c]	1.636	0.277	-0.987	0.736	1.317	0.722
Age[d]	1.307*	0.710	1.664	1.331	0.492	1.257
Income[d]	0.154***	0.399	1.205***	0.399	1.866***	0.583
Being Religious[b]	1.940***	0.222	2.662***	0.418	2.100***	0.388
Ethnicity						
Black[c]	-0.559	0.641	-2.049**	1.044	-1.765	1.922
Other[c]	-0.875	0.947	-0.977	1.788	-2.615*	1.579
Education[b]	4.356***	0.972	5.346***	1.644	1.978	1.889
Number of Children[a]	-0.114	0.405	1.132	0.816	-0.537	0.747
Marital Status						
Married[c]	1.168*	0.667	-1.589	1.204	0.679	1.216
Separated[c]	1.945*	1.034	-0.489	1.605	3.127	1.939
Divorced[c]	0.362	0.724	-1.683	1.203	0.254	1.412
Widowed[c]	1.215	1.226	0.214	1.849	-24.197***	2.462
Region Dummies[c]	Yes		Yes		Yes	
Constant	Yes		Yes		Yes	
Number of Observations	828		261		172	
Wald Chi2	245.64		104.55		330.69	
Prob>Chi2	0.000		0.000		0.000	
Log-Pseudo Likelihood	-1407.25		-386.75		-344.41	

[a]Meas ured as natural logarithm plus one, [b]Multinomial Variable, [c]Dummy Variable, [d]Measured as natural logarithm
Robust standard errors are used.
*Significant at 10%, **significant at 5%, ***significant at 1%

Table 3.11: Tobit Estimation for Non-Altruistic Contributions (1996) - II

Dependent variable: Non-Altruistic Charitable Contributions ($): CONTRIBUTE4[a]

INEQUAL2: Large differences in income are necessary for America's prosperity: 1 (Strongly Agree) – 5 (Strongly Disagree)

	(1) Total		(2) Low Income		(3) High Income	
Inequality Aversion:	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***	***Coefficient***	***Standard Error***
INEQUAL2[b]	0.045	0.148	-0.378**	0.165	0.350*	0.212
Personal Characteristics:						
Female[c]	0.125	0.397	-1.195	0.733	1.327*	0.720
Age[d]	1.252*	0.705	1.548	1.349	0.656	1.242
Income[d]	1.648***	0.280	1.098***	0.414	1.862***	0.608
Being Religious[b]	1.944***	0.222	2.603***	0.408	2.099***	0.386
Ethnicity						
Black[c]	-0.555	0.641	-1.919*	1.047	-1.648	1.904
Other[c]	-0.908	0.944	-1.295	1.810	-2.645*	1.588
Education[b]	4.343***	0.982	5.441***	1.729	1.805	1.969
Number of Children[a]	-0.113	0.404	1.099	0.809	-0.604	0.753
Marital Status						
Married[c]	1.206*	0.667	-1.173	1.212	0.660	1.221
Separated[c]	2.036*	1.031	-0.085	1.607	3.047	1.978
Divorced[c]	0.386	0.723	-1.436	1.207	0.226	1.420
Widowed[c]	1.251	1.222	0.395	1.857	-24.621***	2.541
Region Dummies[c]	Yes		Yes		Yes	
Constant	Yes		Yes		Yes	
Number of Observations	828		261		172	
Wald Chi2	243.23		94.33		329.28	
Prob>Chi2	0.000		0.000		0.000	
Log-Pseudo Likelihood	-1407.59		-388.54		-344.41	

[a] Measured as natural logarithm plus one, [b] Multinomial Variable, [c] Dummy Variable, [d] Measured as natural logarithm

Robust standard errors are used.

*Significant at 10%, **significant at 5%, ***significant at 1%

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