On the Socio-Economic Roots and Macroeconomic Consequences of Terrorism

Dissertation

zur Erlangung des akademischen Grades
des Doktors der Wirtschaftswissenschaften (Dr. rer. pol.),
eingereicht an der Fakultat für Wirtschaftswissenschaften
der Universität Paderborn im Juni 2012

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Acknowledgments

I would like to take this opportunity and thank those people without whose steady support and encouragement I would not have been able to complete this dissertation. First of all, I am highly indebted to my scientific advisors, Professor Thomas Gries (University of Paderborn), Manfred Kraft (University of Paderborn) and Tim Krieger (University of Freiburg) for continuously and generously supporting and improving my research in so many ways. I would also like to thank all my—always supportive—colleagues at the Chair of International Growth and Business Cycle Theory and the Chair of Econometrics and Statistics for the great working atmosphere (and also for tolerating my moods).

Additionally, I want to thank many other colleagues for their help and cooperation, be it through a lively discussion, a sharp but fair comment or a word of encouragement. My special thanks go to Professor Friedrich Schneider (University of Linz), Professor Andreas Freytag (University of Jena), Professor Jens J. Krüger (TU Darmstadt), Professor Tilman Brück (DIW Berlin) and Professor Axel Dreher (University of Heidelberg). Collaborating with them has—without a doubt—greatly enriched my research.

I also have to thank Taylor & Francis and SAGE Publications for making it possible to republish—in slightly revised form—three articles that have already been published in journals managed by these publishers.

I am also highly indebted to my friends and family for all their encouragement. Finally, my deepest gratitude and love go to my parents and Jenny, who supported me all the way, through times good and bad.

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List of Abbreviations

AAA	Alianza Anticomunista Argentina
ADF	Augmented Dickey-Fuller
ASALA	Armenina Secret Army for the Liberation of Armenia
AUC	Autodefensas Unidas de Colombia
AVC	Alfaro Vive, Carajo
BR	Brigate Rosse
DEMSCORE	Decommodification Score
EGP	Ejército Guerrillero de los Pobres
ELN	Ejército de Liberación Nacional
EPR	Ejército Popular Revolucionario
ERP	Ejército Revolucionario del Pueblo
ETA	Euskadi Ta Askatasuna
EZLN	Ejército Zapatista de Liberación Nacional
FAMILY	Public Spending on the Family
FAR	Fuerzas Armadas Rebeldes
FARC	Fuerzas Armadas Revolucionarias de Colombia
FDI	Foreign Direct Investment
FPE	Final Prediction Error
FPMR	Frente Patriótico Manuel Rodríguez
GIA	Groupe Islamique Armé
GDP (p.c.)	Gross Domestic Product (per capita)
GTD	Global Terrorism Database

HDI	Human Development Index
HEALTH	Public Spending on Health
HOUSE	Public Spending on Housing
IBDA-C	İslami Büyükdoğu Akıncılar Cephesi
IMU	Islamic Movement of Uzbekistan
IPS (test)	Im-Pesaran-Shin (test)
ITERATE	International Terrorism: Attributes of Terrorist Events
JRA	Japanese Red Army
LABOR	Public Spending on Active Labor Market Programs
LLC (test)	Levin-Lin-Chu (test)
LMI	Lower Middle Income
LSDV	Least Square Dummy Variable
LTTE	Liberation Tigers of Tamil Eelam
MAPU	Movimiento de Acción Popular Unitario
MEK	Mojahedin-e-Khalq Organization
MIR	Movimiento de Izquierda Revolucionaria
MRTA	Movimiento Revolucionario Túpac Amaru
NPA	New People's Army
OECD	Organization of Economic Co-Operation and Development
OLDAGE	Public Spending on Old Age
OLS	Ordinary Least Squares
PIRA	Provisional Irish Republican Army
PFLP	Popular Front for the Liberation of Palestine
PKK	Parti Karkerani Kurdistan
PP	Phillips-Perron
RAF	Rote Armee Fraktion
RSS	Residual Sum of Squares
SIC/BIC	Schwarz Information Criterion/Bayesian Information Criterion

SL	Sendero Luminoso
SOCEXP	Total Social Public Spending
TA	Terrorist Attacks (per population)
TI	Terrorism Index
TV	Terrorism Victims (per population)
TWEED	Terrorism in Western Europe: Events Data
UCDP/PRIO	Uppsala Conflict Data Program/Peace Research Institute Oslo
UMI	Upper Middle Income
UNEMP	Public Spending on Unemployment
UNEM RPL	Unemployment Replacement Rate
UNIV	Degree of Universalism
VAR	Vector Autoregression
VIF	Variance Inflation Factor
WDI	World Development Indicators
ZA (test)	Zivot-Andrews (test)
ZINB	Zero-Inflated Negative Binomial

Chapter 1

Introduction

Interest in identifying the determinants of terrorism has gained renewed attention after the devastating terrorist attacks on New York and Washington on September 11, 2001. Shortly after the attacks, a quick consensus among intellectuals (Jai, 2001), politicians and the public emerged that poverty—i.e., socio-economic underdevelopment—crucially contributes to the emergence of terrorism. For instance, Kim Dae-jung, the Nobel Peace Prize recipient of 2000, argued that at "[...] the bottom of terrorism is poverty. That is the main cause." (cited in Jai, 2001). Similarly, the then U.S. President George W. Bush (2002) suggested that in underdeveloped countries "[...] persistent poverty and oppression can lead to hopelessness and despair", leading to scenarios where these countries can ultimately become "havens for terror".

Indeed, there is a long tradition among the leaders and followers of terrorist revolutionary movements to attribute their armed struggle (partly) to the prevalence of poor socio-economic conditions. For instance, Vladimir I. Lenin (1906) argued that the "[...] old Russian terrorism was an affair of the intellectual conspirator; today as a general rule guerrilla warfare is waged by the worker combatant, or simply by the unemployed worker." Following his line of reasoning, guerilla warfare (i.e., terrorism) has clear economic underpinnings, being rooted in economic disenfranchisement, unemployment and, more broadly and consistent with the Marxist ideas of historical materialism, the class conflict between the proletariat ("the workers") and the bourgeoisie who owns the means of production.[1]

[1] Cohen-Almagor (1991) also discusses the role of violence and terrorism in the writings of Marx, Engels and Lenin. He also comes to the conclusion that these writers considered terrorist violence to be an

Throughout the 20th century, left-wing revolutionary groups in the developed—e.g., the West German *Red Army Faction* (*Rote Armee Fraktion*, *RAF*) and the Italian *Red Brigade* (*Brigate Rosse*, *BR*)—and in the developing world—e.g., the Argentinian *People's Revolutionary Army* (*Ejército Revolucionario del Pueblo*, *ERP*) and the Philippine *New People's Army* (*Nuevo Ejército del Pueblo*, *NPA*)—referred to such lines of argumentation, styling their terrorist campaigns as armed struggle directed against social injustice and economic oppression on national and global levels (Shughart, 2006). What is more, economic motives have also been repeatedly argued to fuel terrorist movements with ostensibly territorial or religious goals.[2] For instance, Piazza (2011) suggests that economic discrimination of minority groups may have crucially fueled violent activities by terrorist groups such as the Spanish *Basque Homeland and Freedom* (*Euskadi Ta Askatasuna*, *ETA*) and Sri Lanka's *Liberation Tigers of Tamil Eelam* (*Tamil Ila Vitutalaip Pulika*, *LTTE*). Mousseau (2011) argues that urban poverty has filled the ranks of and fueled popular support for Islamist terrorist groups such as the Turkish *Great Eastern Islamic Raiders' Front* (*Islami Büyükdogu Akıncilar Cephesi*, *IBDA-C*) and the *Islamic Movement of Uzbekistan* (*O'zbekiston Islomiy Harakati*, *IMU*).

Yet, terrorism may not only be (partly) rooted in socio-economic underdevelopment. It may also negatively affect economic outcomes. Indeed, the potential threat of terrorism to a country's economic situation has been frequently recognized by politicians. For instance, U.S. President Barack H. Obama (2012) argued that "disruptions to supply chains caused by [...] criminal and terrorist networks [...] can adversely impact global economic growth and prosperity." As a matter of fact, economic destabilization appears to be a prime goal of terrorist organizations (Schelling, 1991). Repeatedly, such organizations have used terrorism as a means of economic warfare, e.g., by deliberately attacking a country's key

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acceptable instrument to promote social change, where social conflict itself was attributed to class (i.e., economic) antagonisms.

[2] Indeed, a number of these terrorist groups have simultaneously embraced left-wing ideas geared towards socio-economic redistribution. For instance, the *Provisional Irish Republican Army* (*PIRA*) fought for the unification of Northern Ireland with the rest of Ireland as a socialist republic (Shughart, 2006). As another example, the Iranian *People's Mujahedin of Iran* (MEK) followed an ideology of Islamic Marxism.

industries—e.g., oil pipelines or centres of the tourism industry—or targeting managers and businessmen (e.g., Lutz and Lutz, 2006). Ultimately, a strategy of economic destabilization aims at inflicting intolerable economic damage on the terrorists' opponents, so that the enemy would be forced to give in to the terrorists' demands to avoid further negative economic consequences (e.g., Sanders and Enders, 2008). For instance, Osama bin Laden (2004) argued that terrorist actions by al-Qaida also serve the purpose of "bleeding America to the point of bankruptcy", so that it would be easier for al-Qaida to realize its ultimate goals (e.g., to repel U.S. influence in the Muslim World).

To sum up, in the popular discourse poor socio-economic conditions have been repeatedly named as a root cause of terrorism, while terrorism's adverse effects on economic growth and development have also not gone unnoticed. Indeed, the self-perception of many terrorist groups suggests that economic motivations matter strongly to their armed struggle, while these groups have also recognized the potential of terrorism as means of economic warfare. Figure 1.1 plots the global number of terrorist attacks between 1980 and 2007 against the global growth of per capita income during this period of time. The data on terrorist activity are drawn from the *Global Terrorism Database*, the *GTD*, as introduced by LaFree and Dugan (2007).[3] The growth series is extracted from the latest version of the *World Development Indicators* (*WDI*), as provided by the World Bank (2012). Figure 1.1 suggests that more terrorist activity negatively correlates with global economic activity (their correlation coefficient is -0.122) and vice versa. For instance, the increase in worldwide terrorist incidents during the early 1990s was associated with a noticeable decline in global economic growth during the same time period. While Figure 1.1. does not allow for causal argumentations, it serves as a starting point for the discussion advanced throughout

[3] Throughout this thesis terrorism is defined as the intentional use of violence (or threat thereof) by a sub-national (i.e., non-state) actor outside the context of legitimate warfare activities (e.g., a civil war), where this act must be aimed at attaining a political, economic, religious or social goal, with the intention to coerce, intimidate or convey some other message to a larger audience than the immediate victims. This is the GTD definition of terrorism (cf. Drakos, 2011). Other databases on terrorist activity employ slightly different definitions of terrorism, given that the phenomenon of terrorism is in itself difficult to define (Anderton and Carter, 2011; Drakos, 2011). This doctoral thesis sticks to the GTD definition of terrorism because the GTD is used as the main source of information on terrorism throughout this thesis (particularly in Chapters 2 and 4).

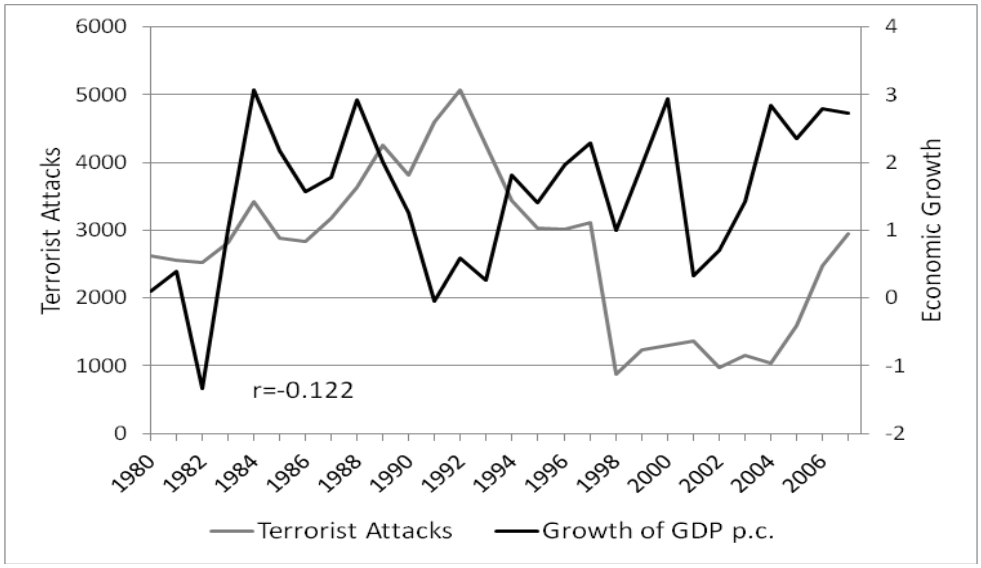

Figure 1·1: Global Terrorist Activity and GDP Growth, 1980-2007

this doctoral thesis on the negative and potentially complex interaction between socio-economic conditions (indicated by global economic growth) and terrorist activity. At a first empirical glance, popular perceptions about the socio-economic roots and negative economic consequences of terrorism do not seem to be unsubstantiated.

This doctoral thesis sheds further light on the relationship between terrorism and the economy. Below, a brief overview of the literature on the economic causes and macroeconomic consequences of terrorism is provided. This section serves the purpose of identifying important gaps in the academic (empirical) literature associated with the terrorism-economy nexus. Note that this section does not provide a more comprehensive overview of this literature for two reasons. First, several studies already provide extensive surveys regarding the determinants of terrorism (e.g., Gassebner and Luechinger, 2011; Kis-Katos et al., 2011; Krieger and Meierrieks, 2011) and its potential economic repercussions (e.g., Lutz and Lutz, 2006; Frey et al., 2007; Bird et al., 2008; Sandler and Enders, 2008). Second, all three empirical studies of this thesis also discuss the literature that is particularly relevant to their respective topic in more detail.

1.1 A Brief Look at the State of Research

1.1.1 Economic Determinants of Terrorism

As shown above, popular wisdom has it that economic conditions matter to the emergence of terrorism. Intuitively, the poor—the likely would-be terrorists—ought to resort to violence to change socio-economic conditions in their favor. Rational-choice theory—the theoretical workhorse of most economic analyses of the determinants of terrorism (e.g., Sandler and Enders, 2004; Caplan, 2006)—can be used to provide a theoretical reasoning that mirrors this popular wisdom. In short, in a rational-choice approach terrorists are considered rational actors who want to maximize their (political) utility from using terrorism as a means to facilitate socio-political change, where they are subject to certain constraints such as financial resources or manpower (e.g., Sandler and Enders, 2004). Then, terrorists are expected to choose the optimal (i.e., utility-maximizing) level of violence by considering the benefits from terrorism (e.g., from gaining government concessions) as well as its costs (e.g., from government punishment) and opportunity costs (e.g., from foregone earnings). Arguably, a country's long-run level of socio-economic development (measured by, e.g., poverty or income inequality) and short-run state of the economy (indicated by, e.g., economic growth) can be expected to influence the terrorists' calculus. For example, Blomberg et al. (2004a, b) introduce a model in which the poor state of the economy (i.e., slow economic growth) fosters terrorist activity. They argue that the benefits from terrorism during economic downturns increase because terrorist success (i.e., a redistribution of wealth) means more access to an otherwise scarce resource base. Also, slow growth means that the opportunity costs of terrorism are particularly low because, e.g., non-violent opportunities of economic participation are limited.

However, the empirical literature on the determinants of terrorism is far from producing consistent results regarding the role of economic factors in terrorism. For one, there is robust empirical evidence that economic success immunizes against the occurrence of civil wars (e.g., Sambanis, 2002; Fearon and Laitin, 2003). Some studies also find that

socio-economic progress is detrimental to terrorism as a form of lower-scale conflict. For instance, Blomberg et al. (2004b) and Blomberg and Hess (2008a, b) find that economic progress is associated with a decrease in terrorism. What is more, further studies point at indirect linkages between terrorism and the economy, where any improvement of socio-economic conditions—as intervening variables—that is a consequence of some underlying policy change (the development of a welfare state, economic liberalization etc.) ultimately reduces terrorist activity. For example, Li and Schaub (2004) find that economic integration tends to have a beneficial effect on economic growth and development, which in turn makes terrorism less likely by driving up the price of terrorism. Similarly, Burgoon (2006) argues that social welfare policies reduce terrorist activity through their beneficial effect on the socio-economic causes of terrorism (e.g., economic insecurity, inequality). Finally, Piazza (2011) finds that economic discrimination leads to domestic terrorism, whereas policies that counter this kind of discrimination may discourage terrorism that otherwise would have emerged due to economic grievances.

For another, most empirical studies on the causes of terrorism stress the primacy of non-economic over economic variables in terrorism (e.g., Gassebner and Luechinger, 2011; Kis-Katos et al., 2011; Krieger and Meierrieks, 2011).[4] For instance, Basuchoudhary and Shughart (2010) find that terrorism is more strongly related to ethnic tension than to economic development. Abadie (2006) finds that terrorism is more likely in countries that are politically semi-open (meaning that they are neither democracies nor autocracies) with a geography that is favorable to a sustained terrorist campaign (e.g., jungle, mountains) by providing terrorists with safe havens. Kurrild-Klitgaard et al. (2006) also point at a non-linear relationship between political conditions and terrorism, while Piazza (2008) and

[4]Some empirical studies have also tried to identify the micro determinants of terrorism, i.e., those variables that matter to the individual decision to participate in terrorism. While such a micro perspective is not the focus of this thesis, it is nevertheless interesting that these studies also usually do not find that poor economic conditions lead to terrorism. For instance, Krueger and Maleckova (2003) find that terrorists active in the Arab-Israeli conflict are in fact fairly well-off and educated. Still, such a relationship between individual living conditions and terrorist participation does not necessarily imply that national social conditions do not matter. As noted by Krueger and Maleckova (2003), well-off and educated individuals may nevertheless become terrorists—e.g., as a "revolutionary vanguard" in a left-wing fashion—to voice dissent over a country's general socio-economic situation.

Kis-Katos et al. (2011) find that political instability (e.g., state failure) is conducive to the emergence of terrorism.

To sum up, while there is a theoretical foundation to the popular wisdom that economic variables matter to terrorism, the empirical evidence regarding this relationship is mixed. It seems to be the case that socio-economic underdevelopment—similar to other social conditions such as political openness or instability—is neither a necessary nor sufficient conditions for the emergence of terrorism. As also shown in Table 1.1, some studies find that economic factors determine terrorist activity, while others come to a different conclusion. Below, the possible explanations for this discrepancy are discussed in more detail. Certainly, this discrepancy calls for more research on the economic determinants of terrorism and for a cautious research design that finds ways to control for other terrorism determinants or the (potential) heterogeneity with respect to the determinants of terrorism.

1.1.2 Macroeconomic Effects of Terrorism

As already noted earlier, terrorism may not only have socio-economic roots but may also aim at economic destabilization (as an intermediate goal) to succeed in achieving ultimate socio-political goals (e.g., a redistribution of wealth or territory).[5] Economic destabilization is expected to improve the terrorists' bargaining position by inflicting costs upon the government which has to weigh the cost of making political concessions against the present and anticipated costs of a prolonged terrorist campaign—e.g., in the form of reduced economic activity—that result from the decision of not negotiating with terrorists (Sandler and Enders, 2008). In economic theory such mechanisms are typically modelled as out-

[5] The other intermediate goals of terrorists to foster their agenda are political destabilization and media attention (Schilling, 1991). The political repercussions of terrorism are analyzed in, e.g., Berrebi and Klor (2008), Blomberg et al. (2011b) and Dreher et al. (2010). These studies show that terrorism may indeed affect a domestic political system, possibly contributing to instability and the erosion of civil liberties. The interplay of terrorism and the media is discussed in, e.g., Frey (1988), Nelson and Scott (1992) and Rohner and Frey (2007). These studies usually hint at the reciprocal relationship between terrorism and the media, where terrorism successfully produces media attention (meaning terrorist success insofar as their ideology is spread), while the media benefits from terrorism in terms of increased newspaper sales or television audience.

Study	Scope	Type of Terrorism	Economic Determinants	Main Results
Abadie (2006)	186 countries 2003-2004	Terrorism risk index	GDP p.c.; Gini index Human Development Index [HDI]	No significant relationship between economic variables and terrorism
Blomberg and Hess (2008a)	179 countries 1968-2003	Transnational terrorism (origin/target)	GDP p.c.; trade openness	High income, more openness make a country less likely to produce terror but more likely to be targeted by it
Krueger and Maleckova (2003)	148 countries 1997-2002	Transnational terrorism (origin)	GDP p.c.	No effect of per capita income on the emergence of terrorism
Li and Schaub (2004)	112 countries 1975-1997	Transnational terrorism (target)	GDP p.c.; trade openness; FDI; portfolio investment	Terrorism negatively related to GDP p.c., with economic integration reducing it by stimulating growth
Piazza (2006)	96 countries 1986-2002	Transnational terrorism (target)	Unemplyoment; economic growth; HDI; Gini index; inflation; malnutrition	Economic variables do not matter substantially to incidences of terrorism
Piazza (2011)	172 countries 1970-2006	Domestic terrorism	GDP p.c.; Gini index; HDI; minority economic discrimination	Terrorism more likely in rich countries (high GDP p.c./HDI) with high inequality and economic discrimination

Table 1.1: Findings of Assorted Empirical Studies on the Economic Causes of Terrorism

comes of either rational-choice considerations by the government or a game between the government and a terrorist opposition (e.g., Lapan and Sandler, 1988; Sandler and Enders, 2004; Arce and Sandler, 2005; Sandler and Siqueira, 2009).

Terrorism may impair economic activity directly by destroying an economy's human and physical capital stock through destruction (loss of lives, property damage etc.) and indirectly as markets and economic agents react to it. For instance, terrorism is anticipated to hurt certain sectors of an economy (e.g., tourism) that are particularly exposed to it (Bird et al., 2008). On an aggregate level, terrorism may distort national levels of consumption, investment, government spending and savings. For instance, terrorism creates uncertainty, leading to the postponement of long-term investments or increased government spending on security at the expense of (more productive) spending on education and infrastructure, which ultimately reduces growth (Bird et al., 2008). On an international level, terrorism may lead to the diversion of capital and trade flows because it poses a costly risk and reduces the returns to investment (Abadie and Gardeazabal, 2008). The resulting withdrawal of international capital may hurt economic development, in particular when foreign finance and investment are important engines of growth.

Empirically, the evidence regarding the economic consequences of terrorism is mixed. For one, several empirical studies find that terrorism has negative effects on macroeconomic variables such as consumption, investment, and public spending (e.g., Crain and Crain, 2006; Gaibulloev and Sandler, 2008) and on the international flow of goods and capital (e.g., Abadie and Gardeazabal, 2008). Such effects help to explain why several studies find that terrorism is detrimental to economic growth on sub-national, national and global levels (e.g., Abadie and Gardeazabal, 2003; Crain and Crain, 2006; Gaibulloev and Sandler, 2008, 2011). For instance, Crain and Crain (2006) calculate that in the absence of terrorism in the year 2002 world GDP would have been $3.6 trillion U.S. dollars higher than it was that year.

For another, however, some studies are more skeptical with respect to the macroeconomic consequences of terrorism (e.g., Tavares, 2004; Enders et al., 2006; Gaibulloev and

Sandler, 2009). These studies find that the economic effects of terrorism are rather modest and short-lived, where country-specific conditions (a country's level of politico-institutional development, political stability, its culture etc.) matter to a country's economic vulnerability to terrorism. For instance, Tavares (2004) finds that terrorism produces rather marginal negative effects on a country's economic performance vis-a-vis the negative macroeconomic repercussions of natural disasters and currency crises. He also finds that democratic countries suffer less damage from terrorism than non-democratic economies, potentially because economic and political power is more strongly decentralized (so that terrorism is less likely to produce distorting effects) and responses to terrorism by democratic governments (e.g., interventionist policies) are less likely to produce extreme outcomes that impair economic performance.

In summary, while there is a theoretical reasoning as to why terrorists ought to aim at economic destabilization (to increase their bargaining position) and as to how terrorism may hurt the economy (by negatively affecting the allocation and accumulation of resources), the empirical evidence on the macroeconomic effects of terrorism—similar to the literature on the economic causes of terrorism—is rather inconclusive. This is also shown in Table 1.2 which summarizes the findings of some empirical studies on the economic repercussions of terrorism. The next section provides several explanations for these inconsistencies.

1.2 Gaps in the Literature

The brief overview of the academic literature on the economic causes and consequences has shown that there is no consensus on either issue. This section serves the purpose of identifying several gaps in this literature. Filling these gaps ought to contribute to a better understanding of the terrorism-economy nexus and may help explaining the inconclusive evidence on this nexus.

Study	Scope	Type of Terrorism	Economic Variables	Main Results
Crain and Crain (2006)	147 countries 1968-2002	Transnational terrorism	GDP p.c.; investment; consumption; tourism	Terrorism produces substantial economic damage
Enders et al. (2006)	69 countries 1989-1999	Transnational terrorism	U.S. FDI	Small negative effect of anti-U.S. terrorism on U.S. FDI
Gaibulloev and Sandler (2009)	42 countries 1970-2004	Transnational terrorism	Economic growth; investment; government share	Terrorism affects economic variables only in less developed (Asian) countries
Gaibulloev and Sandler (2011)	51 countries 1970-2007	Domestic and transnational terrorism	Economic growth	Transnational terrorism has modest negative effect on growth, whereas the effect of domestic terrorism is weaker
Llussa and Tavares (2011)	187 countries 1970-2007	Domestic and transnational terrorism	Consumption; investment; public consumption; output	Negative effect of terrorism on private consumption and investment, but not on output and public consumption
Nitsch and Schumacher (2004)	217 countries 1960-1993	Transnational terrorism	Bilateral trade	Terrorism substantially reduces the trade volume between two countries

Table 1.2: Findings of Assorted Empirical Studies on the Macroeconomic Effects of Terrorism

1.2.1 Causality

One important gap in the existing literature on the terrorism-economy nexus is that the question of *causation* is largely disregarded. Plausibly, and consistent with the empirical findings reviewed above, economic conditions may determine terrorist activity. Alternatively, terrorism may have a negative causal effect on these very conditions. Or feedback between terrorism and economic development may exists, where economic conditions impact the opportunity costs of terrorism, while terrorism *simultaneously* affects the allocation and accumulation of resources.

Indeed, some contributions on the terrorism-economy nexus acknowledge the potentially complex links between terrorism and economic variables. For instance, Piazza (2009: 406-407) argues that "[...] scholars and analysts who link terrorism with poor levels of economic development fail to carefully distinguish cause from effect. In countries that have suffered long bouts of terrorist activity, it is possible that poverty is the *result* of terrorism rather than the cause." Sandler and Enders (2008: 25) note that "[...] economic conditions may be both a root cause of terrorism and a consequence of terrorism" so that "[...] a researcher must be prudent to test and/or correct for a potential endogeneity bias." Indeed, econometrically *endogeneity*—meaning a situation where the independent variables are not independent of the error term, thereby violating one assumption of the classical linear regression model where the covariance of the explanatory variable and the error term ought to be equal to zero (e.g., Maddala, 2001: 343)—may produce biased and inconsistent parameter estimates and affect hypotheses tests in settings where such feedback exists (e.g., Greene, 2012: 259-263).

Nevertheless, most studies on the causes and economic effects of terrorism—e.g., see Tables 1.1 and 1.2—largely ignore the potentially complex interaction of terrorism and economic variables and instead assume a relationship between them that clearly differentiates between cause and effect. One exception to this rule is Abadie (2006) who shows that once the dependence of economic development on terrorism is properly accounted for there is no longer a statistically significant effect of economic development on the emergence of

terrorism.[6] The potential existence of reverse or bidirectional causality may bias empirical findings on the terrorism-economy nexus, calling for more cautious econometric modelling, e.g., by means of (panel) vector autoregression (VAR) models in which all employed variables serve as independent and dependent variables and are jointly determined in a system of simultaneous equations (e.g., Stock and Watson, 2001). At the same time, such econometric approaches allow to *directly* test for causation.[7] This may shed further light on the potentially complex causal linkages between terrorism and socio-economic conditions. For instance, one may find evidence of bidirectional causation between terrorist conflict and economic decline, implying a vicious circle of violence and reduced economic activity. Such a relationship might be missed in (conventional) empirical studies that rely on econometric methods that only work with "fixed" causal expectations.

1.2.2 Heterogeneity in the Causes and Consequences of Terrorism

As shown in the short review above, some studies find that economic factors matter to terrorism, while others come to a different conclusion. Similarly, there is evidence that terrorism produces economic damage, while some studies come to more skeptical conclusions. Possibly, the inconclusive evidence on the terrorism-economy nexus results from the existence of *heterogeneity in the causes and consequences of terrorism*. Heterogeneity in the causes of terrorism means that socio-economic conditions may determine terrorist activity

[6] Abadie (2006) uses an instrumental variable approach. He treats the economic variables in his model (e.g., GDP p.c.) as endogenous and instruments them with landlock, arguing that variation in geographic landlock affects terrorism only through its effect on income levels (where landlocked countries are poorer due to higher transportation costs and lower levels of economic integration). While this approach seems to properly account for reverse causation, it is only feasible in a cross-national study such as Abadie's (2006). For panel (cross-national time-series) or time-series analyses—as employed in this doctoral thesis—other analytical tools to uncover causal relationships in the terrorism-economy nexus are needed.

[7] Testing for causation in a statistical sense, as it is done in this thesis, does not necessarily imply causation in a philosophical sense. Throughout this contribution—particularly in Chapters 3 and 4—causality refers to the concept of *Granger causality*, which tries to establish whether an event A (e.g., terrorism) occurs before an event B (e.g., economic decline), whether the opposite is true or whether both events are contemporaneous (Granger, 1969; Maddala, 2001: 379-381). One may speculate about causation between A and B in a philosophical sense ("A leads to B"), particularly when there is a theoretical foundation to this argument. However, such an argumentation should only be understood as a (cautious) *interpretation* of related findings, given that it usually goes beyond the (statistical) scope of the concept of Granger causality (e.g., Maddala, 2001: 379).

in some, but not all countries. Heterogeneity in the consequences of terrorism means that terrorism may produce detrimental economic repercussions in some, but not all countries.

With respect to heterogeneity in the causes of terrorism, terrorist organizations indeed usually differ with respect to their ideological motivations and ultimate goals, where some terrorist groups may be more responsive to socio-economic change than others. For instance, it seems plausible to assume that the Guatemalan *Guerilla Army of the Poor (Ejército Guerrillero de los Pobres, EGP)* which emerged in response to poverty and socio-economic discrimination and fought for a removal of socio-economic grievances (e.g., Lopez, 1988) has been more responsive to an amelioration of socio-economic grievances than the *Islamist Izz ad-Din al-Qassam Brigades* (i.e., *Hamas*) who continues to fight for the establishment of an Islamic Palestinian state and whose active members seem to be on average rather well-off and highly educated (e.g., Krueger and Maleckova, 2003). Still, most large-N studies on the causes of terrorism usually pool terrorism data—irrespective of different ideological motivations and goals of terrorist groups—to test the relationship between terrorism and specific social conditions. Implicitly, these studies work with the assumption that there is a unique terrorist calculus which specific social variables (e.g., measuring socio-economic conditions) enter the same way across all countries. Yet, it seems more plausible to assume that economic grievances matter to some (e.g., the *Ejército Guerrillero de los Pobres*), but not to all terrorist insurgencies. Intuitively, there ought to be a stronger connection between economic variables and left-wing (which is usually geared towards socio-economic change) or separatist terrorism aiming at territorial goals (which is often also tied to economic discrimination; see Piazza, 2011) than between the economy and religious terrorism (which commonly strives for religious motives). Economically speaking, the calculus of terrorists may be intrinsically tied to their ideology and goals, where socio-economic progress can be expected to have a stronger (terrorism-reducing) effect on the opportunity costs of left-wing and ethnic terrorists than on the calculus of religious terrorists (e.g., Freytag et al., 2011). Bernholz (2004, 2006) even goes so far as to argue that Islamist terrorists are completely irresponsive to socio-economic incentives

due to their adherences to supreme values, on which they build to justify terrorism and which are preferred to all else. Indeed, first evidence for the idea that different types of terrorism emerge in response to distinct social conditions is provided by Robison et al. (2006) who find that left-wing and Islamist terrorism are driven by different determinants, with left-wing terrorism being more responsive to economic variables.

Similarly, heterogeneity in the macroeconomic effects of terrorism may mean that terrorism produces detrimental economic repercussions in some, but not all countries. For one, the level of terrorist activity ought to matter. As noted by Sandler and Enders (2008), a more intense and persistent terrorist campaign is more likely to inflict economic costs than isolated attacks. Also, terrorism is anticipated to be particularly effective in terms of economic damage when it is used as a form of economic warfare (e.g., Lutz and Lutz, 2006). For instance, Powers and Choi (2012) find that terrorism directed against business interests is more likely to scare off FDI than non-business terrorism.

For another, the vulnerability of a country to terrorism ought to play a role. As argued by Sandler and Enders (2008), a country's robustness to terrorism crucially depends on its level of socio-economic and politico-institutional development, where terrorism ought to have a stronger impact on less economically and politically developed countries. For instance, a small economic size (i.e., low GDP p.c.) makes it more likely that the negative effects of terrorism feed through to reduced economic activity. Similarly, low levels of diversification and institutional capacity—as other variables indicating politico-economic underdevelopment—make it less likely that substitution of economic activity away from vulnerable to robust sectors of the economy takes place (accompanied by quick adjustments in prices and resource allocation), resulting in stronger negative repercussions from terrorism (Bird et al., 2008). Economies may also be particularly prone to the negative repercussions of terrorism when economic and political power is strongly centralized (e.g., Frey and Luechinger, 2004) or when the government effectiveness in responding to terrorist activity is poor due to, e.g., autocratic structures which are likely to respond to the threat of terrorism with excessive, counter-productive measures (Tavares, 2004). Differences in

country-specific robustness to terrorism may explain why economic activity in some countries quickly rebounds (e.g., as it was the case in the U.S. after the 9/11 attacks) , while other (developing) countries suffer sustained economic losses from terrorism (Sandler and Enders, 2008).[8] Yet, the role of country-specific conditions in governing the socio-economic consequences of terrorism is usually not recognized in large-N studies. Rather, these studies estimate an "average" effect of terrorism on macroeconomic aggregates such as GDP p.c., investment or consumption. Heterogeneity in the economic consequences of terrorism is not accounted for, a problem also recognized by Sandler and Enders (2008: 43) who argue that "[the] estimation's average picture may not be descriptive of many sample countries, especially when the panel includes vastly diverse countries."

To sum up, heterogeneity in the causes of terrorism means that socio-economic development may determine terrorist activity in some, but not all countries (depending on the terrorists' responsiveness to economic incentives). Similarly, heterogeneity in the consequences of terrorism means that terrorism may result in economic damage in some, but not all economies (depending on the level of terrorist activity and an economy's robustness). The assumption of homogeneity in the causes and consequence of terrorism—common in related large-N studies—is probably incorrect. Econometrically, the incorrect assumption of parameter homogeneity may have serious consequences for statistical inferences, as shown by, e.g., Plümper et al. (2005). For instance, the heterogeneous effects of socio-economic underdevelopment on terrorism may be masked when large-N studies incorrectly assume that parameter homogeneity prevails. For any causal analysis of the terrorism-economy nexus one may consequently not only expect a homogenous causal effect of terrorism on the economy (and vice versa), but also more complex causal links (heterogenous causation) that are governed by terrorism- and country-specific factors.

[8] Sandler and Enders (2008: 18) find that terrorist activity against foreign ships (the U.S. destroyer *USS Cole* and the French oil tanker *Limburg*) resulted in a loss of $3.8 million per month to the shipping industry of Yemen, which translated into a substantial loss of income and a rise in unemployment. They argue that Yemen's small economic size and low level of diversification were to blame for the significant negative effects on its economy that resulted from a rather small number of attacks.

1.2.3 Domestic and Transnational Terrorism

Another gap in the existing research on the terrorism-economy nexus is a consequence of the *lopsided focus on the phenomenon of transnational terrorism* by previous research efforts.[9] By definition (e.g., Sandler and Enders, 2004: 302), terrorism is transnational when more than one country is involved, while domestic terrorism only affects one country. For example, an attack of the German *RAF* on a German politician in Germany (e.g., the assassination of the German Attorney General Siegfried Buback and his companions in Karlsruhe in 1977) is a domestic terrorist attack only involving German perpetrators and victims inside Germany. By contrast, an attack by the *RAF* on a U.S. target in Germany (e.g., the bombing of an U.S. Army building in Frankfurt in 1972) is a transnational incidents as it involves the targeting of non-Germans. As other examples of transnational terrorism, a terrorist group may "export" terrorism to another country (e.g., attacks by the *Groupe Islamique Armé*, *GIA*, in France), where its activity may also be sponsored by a third country (e.g., Iran-backed *Hezbollah* attacks against Israel). While domestic terrorism is far more common than transnational terrorism[10], previous empirical studies have overwhelmingly analyzed the (economic) roots and (economic) consequences of transnational terrorism. This is due to data constraints. The oldest and most widely used dataset on terrorism, the *International Terrorism: Attributes of Terrorist Events* (*ITERATE*) dataset, only provides information on transnational terrorist activity (Drakos, 2011). Only recently—i.e., after 2008—the GTD has made data available on domestic and transnational terrorism (LaFree and Dugan, 2007; Drakos, 2011). While it is consequently understand-

[9] Empirical research on transnational terrorism may analyze two aspects of it. For one, it may analyze why certain countries are targeted by transnational terrorism (target definition). For another, it may assess why certain countries breed transnational terrorism (origin definition). Economic variables may interact differently with terrorism, depending on which definition of transnational terrorism is used. For instance, Blomberg and Hess (2008a, b) show that while economic progress makes it less likely that a countries produces transnational terrorism (origin definition), it also makes it a likelier victim of transnational attacks at the same time (target definition). With respect to the terrorism-economy nexus (particularly considering the economic determinants of terrorism), the origin definition of transnational terrorism seems to be more important, so that this doctoral thesis focuses on the evidence that relates (economic) variables to the production of transnational terrorism.

[10] Commonly, the relation between domestic and transnational terrorist attacks is assumed to be between ca. 3:1 to 4:1 (Sanchez-Cuenca and De La Calle, 2009; Enders et al., 2011).

able that the empirical research—as shown in Tables 1.1 and 1.2—has focused on the issue of transnational terrorism, this very focus may be problematic. For one, domestic and transnational terrorism may have different roots. For another, domestic and transnational terrorism may have different effects on economic activity. This calls for research analyzing the roots and effects of domestic terrorism and contrasting these findings with the empirical research on the causes and consequences of transnational terrorism.

Considering the economic determinants of terrorism, the empirical mainstream so far suggests that economic variables do not matter strongly to terrorism (e.g., Gassebner and Luechinger, 2011; Kis-Katos et al., 2011; Krieger and Meierrieks, 2011). Indeed, this may be due to the fact that these studies overwhelmingly analyze the roots of transnational terrorism.[11] In fact, a substantial body of literature suggests that the internationalization of terrorism is motivated by international cultural-economic (globalization) and political factors (e.g., foreign policy behavior, foreign occupation). For instance, Zimmermann (2011) argues that various aspects associated with the phenomenon of globalization (immigration, the global spread of ideologies and information, network effects, social polarization etc.) are conducive to the emergence of transnational terrorist activity. Similarly, Bergesen and Lizardo (2004) and Lizardo (2006) suggest that transnational terrorism emerges in response to the forces of cultural and political globalization, particularly as a (cost-efficient) weapon of the disenfranchised against the economic, political and economic power of the West. Similarly, the empirical findings of a number of empirical studies (e.g., O'Brien, 1996; Pape, 2003; Bapat, 2007; Dreher and Gassebner, 2008; Savun and Phillips, 2009; Plümper and Neumayer, 2010; Conrad, 2011) suggest that a country's foreign policy behavior is a crucial determinant of transnational terrorist activity directed against its interests. For instance, Dreher and Gassebner (2008) find that political proximity to the U.S. makes a country a likelier target of transnational attacks. Likewise, Conrad (2011) argues that there is a

[11] As a matter of fact, when work on this doctoral thesis started in 2009, there were almost no empirical studies on the origins of domestic terrorism, as summed up by Sanchez-Cuenca and De La Calle (2009). While some recent contributions (Bandyopadhyay and Younas, 2011; Dreher and Fischer, 2011; Kis-Katos et al., 2011; Piazza, 2011) focus on the determinants of domestic terrorism, obviously this topic remains underanalyzed, particularly compared to the vast literature on the roots of transnational terrorism.

strong (positive) interaction between interstate rivalry, the sponsorship of terrorism and the prevalence of transnational terrorism.

To sum up, there is considerable evidence that terrorism internationalizes in response to specific developments in the global economic (economic integration), cultural (e.g., spread of culture and "clash of civilizations"), military (e.g., interventions) and political (e.g., aggressive foreign policy) order. The fact that transnational terrorism is strongly driven by the global order may explain why (domestic) socio-economic factors do not matter strongly to this kind of terrorism. However, it is unclear to what extent the global order matters to domestic terrorism. For example, Savun and Phillips (2009) find that democracies are vulnerable to transnational terrorism (due to specific foreign policies undertaken by democracies), while they are not particularly prone to domestic terrorism. This may indicate that domestic and transnational terrorism are—at least, partly—determined by different factors.[12] In particular, one may speculate that domestic terrorism has stronger economic roots, while material conditions do not matter substantially to transnational terrorism which in turn may be more strongly fueled by foreign policy considerations and rather abstract trends in globalization. This line of reasoning calls for an analysis of the (economic) determinants of domestic terrorism, where related findings should then be contrasted with the evidence regarding the (economic) roots of transnational terrorism.

Considering the economic consequences of terrorism, the (empirical) academic research has predominantly analyzed the negative repercussions of transnational terrorism on the economy (cf. Table 1.2). Yet, the effect of domestic and transnational terrorism on economic activity may also be—as with their economic roots—non-symmetric. For one, domestic terrorism is a far more common phenomenon than transnational terrorism (Sanchez-Cuenca and De La Calle, 2009; Enders et al., 2011). As previously argued, the economic

[12] A counter-argument to this reasoning is provided by Sanchez-Cuenca and De La Calle (2009). They argue that the actors of domestic and transnational terrorism (i.e., terrorist organizations) are usually identical. Most terrorist groups attack inside their "natural territory" or "homeland", where they may target inhabitants of their own country (domestic terrorism) or citizens of other countries (transnational terrorism). They also argue that few terrorist groups systematically attack outside their "natural territory" for only international reasons. The idea that domestic and transnational terrorism have similar determinants is also supported by Kis-Katos et al. (2011).

effects of terrorism also depend on the level and persistence of terrorist activity (e.g., Sandler and Enders, 2008). Then, a sole focus on transnational terrorist activity may lead to an underestimation of terrorism's negative repercussions, whereas considering domestic and transnational terrorism ought to give a more precise picture of terrorism's potential to detrimentally affect the economy. For another, however, Gaibulloev and Sandler (2011) argue that the domestic component of terrorism may be less harmful to economic development because this kind of terrorism can be better controlled (e.g., it does not require cross-border actions), is a more predictable risk (because it is more common) and is less threatening to outward-oriented economic sectors (e.g., trade, FDI, tourism) that are vital sources of economic success especially in developing economies. As a matter of fact, the evidence on the different effects of domestic and transnational terrorism on the economy is inconclusive and sparse. For instance, while Gaibulloev and Sandler (2008) find that both domestic and transnational terrorism substantially reduce economic growth in Western Europe, Gaibulloev and Sandler (2011) for a sample of African economies find that only transnational terrorism inhibits economic growth in this part of the world. Clearly, this inconclusiveness means that an empirical analysis of the effects of domestic terrorism—possibly, in combination with transnational terrorism—on the economy is needed and ought to contribute to a better understanding of the terrorism-economy nexus.

1.2.4 Measuring Socio-Economic Conditions

A final gap in the literature that may contribute to the inconclusive evidence regarding the economic roots and effects of terrorism is related to the *measurement of socio-economic development*. In many empirical studies it is measured by (real) GDP per capita (e.g., Li, 2005; Abadie, 2006; Kurrild-Klitgaard et al., 2006; Krueger and Laitin, 2008; Basuchoudhary and Shughart, 2010). It is usually interpreted as an indicator of foregone earnings that determines the opportunity costs of terrorism associated with the level of socio-economic underdevelopment (e.g., Abadie, 2006: 51). However, per capita income may also be interpreted as a measure of state capacity. A prominent example of such an interpretation

is provided by Fearon and Laitin (2003: 80) in their analysis of the determinants of civil war. They argue that higher per capita income corresponds to a higher level of state capacity (in terms of infrastructure, bureaucracy etc.), where higher levels of state capacity make a civil war less likely. Holtermann (2012) also provides empirical support for this hypothesis. However, while state capacity deters large-scale conflicts (civil wars), it may actually be *positively* related to lower-scale violence (terrorism). When insurgents face a sufficiently strong enemy (in terms of state capacity) they do not challenge him openly (civil war) but resort to highly asymmetric warfare (terrorism) which is the cost-efficient means to violently voice dissent under such circumstances. Indeed, Sanchez-Cuenca and De La Calle (2012) show that open insurgencies (which involve territorial control by insurgents) are more likely in poor countries, while clandestine terrorist activity (which does not involve territorial control but uses a distinct modus operandi associated with its underground existence) is more likely in richer countries.[13] Again, Sanchez-Cuenca and De La Calle (2012) interpret per capita income as a measure of state capacity rather than socio-economic development.

Admittedly, the openness of the usual indicator of socio-economic conditions (per capita income) to interpretation is particularly important to the study of the roots of terrorism. However, it may also matter when the effects of terrorism are assessed. For one, if a higher per capita GDP is seen as an indicator of a higher level of (individual) material wealth, it is expected to make terrorism less likely by raising its opportunity costs. Following this interpretation, one would also expect terrorism to affect it negatively by distorting the allocation and accumulation of resources within an economy. For another, however, if a higher per capita GDP is intended to indicate a higher level of state capacity, it ought to be positively related to terrorism by driving up the price of an open insurgency and making a terrorist insurgency the cost-efficient mode of resistance. By the same token, terrorism

[13] Interestingly, a number of empirical studies that control for the effect of state capacity on terrorist activity find they are positively correlated (e.g., Li and Schaub, 2004; Li, 2005; Burgoon, 2006; Gassebner and Luechinger, 2011). However, these studies do not interpret this positive association as evidence for a substitution of open for clandestine violence in the face of a sufficiently strong enemy.

may also correspond to higher levels of state capacity, given that, e.g., terrorism usually triggers public investment in defence and security (e.g., Gupta et al., 2004). To sum up, disregarding the potentially detrimental effects of socio-economic underdevelopment and state capacity—*which are usually measured by the same indicator*—may have serious consequences for statistical analyses, making it rather difficult to identify the isolated effect of socio-economic development on terrorism (and vice versa).

This issue calls for alternative measures of socio-economic conditions in empirical analyses. First, one can use less ambiguous socio-economic variables (rates of economic growth, unemployment, inflation, income inequality indices etc.). Second, one can use variables that only indirectly reflect the effect of socio-economic conditions on terrorism. For instance, Li and Schaub (2004) argue that economic integration reduces terrorism by stimulating economic growth and reducing poverty. Burgoon (2006) suggests that social welfare policies tend to make terrorism less likely by reducing poverty and economic inequality and by limiting the influence of extremist groups in society. Piazza (2011) argues that certain economic policies may reduce minority economic discrimination, in turn making terrorism rooted in this very discrimination less likely. Generally speaking, these studies argue that certain variables (measuring, e.g., welfare policies) reduce terrorism only through their effect on a set of *intervening socio-economic variables*, meaning that through such an empirical approach the *aggregate* effect of socio-economic conditions rather than the isolated effect of specific economic variables is identified, consequently providing a presumably clearer picture of to what extent terrorism is actually rooted in socio-economic underdevelopment.[14]

[14]It may be an interesting avenue of future research to study the relationship between terrorism and specific social conditions through structural equation (latent variable) models, given that many social conditions that may incite terrorism (e.g., economic insecurity, frustration, discrimination, humiliation) are difficult to measure, i.e., potentially unobservable (latent). However, structural equation models are highly sensitive to misspecifications (e.g., Sanchez et al., 2005). Thus, more traditional statistical tools are used throughout this doctoral thesis.

1.3 Structure of Thesis and Outlook

In the following chapters of this doctoral thesis, three empirical studies are presented that help to fill the research gaps outlined above, therefore adding to a better understanding of the terrorism-economy nexus.

Chapter 2, *Terrorism in the World of Welfare Capitalism*, builds on a joint work with Tim Krieger. It is a slightly revised version of a paper that was published in the *Journal of Conflict Resolution* 54(6), 902-939. Earlier versions of this paper were presented at the Annual Congress of the Verein für Socialpolitik (Magdeburg, 2009) and the 4th Network for the Economic Analysis of Terrorism Workshop (Brussels, 2009). This contribution analyzes the relationship between welfare policy measures (indicated by social spending and welfare regime variables) and the emergence of domestic terrorism for 15 Western European countries during the 1980-2003 period. Building on and expanding an earlier study by Burgoon (2006), this chapter argues that social policies ameliorate poor short-run and long-run socio-economic conditions (e.g., unemployment, poverty, inequality, dissatisfaction) which would otherwise lead to violence, thereby indirectly reducing terrorist activity.

This contribution adds to the empirical literature on the terrorism-economy nexus by, first, using an alternative measure of socio-economic conditions that assesses the overall effect of socio-economic improvements—induced by social spending and welfare programs—on terrorism, instead of using proxies that may be prone to measurement error or may be difficult to interpret.

Second, it focuses on the economic determinants of domestic rather than transnational terrorism. It also examines whether there are differences between the driving forces of domestic terrorism in Western Europe and transnational terrorism that is "imported" into this part of the world (as non-European terrorist groups attack within Europe). To preview the paper's results, it finds that higher levels of social spending in certain fields (health, unemployment benefits and active labor market programs) are associated with less domestic terrorism. Moderate evidence indicates that the different worlds of welfare capitalism

differently impact homeland terrorism. Social-democratic welfare regimes that create low levels of market dependence are on average less prone to domestic terrorist activity. These social spending and welfare regime variables usually do not matter to terrorist activity "imported" from non-European countries and conflicts. This provides support for the idea that domestic terrorism is more strongly determined by socio-economic conditions than transnational terrorism.

Third, this paper accounts for the issue of heterogeneity in the causes of terrorism by focusing on a panel of homogeneous countries, namely industrialized Western European countries with mature social welfare systems. For one, terrorism in this part of the world is overwhelmingly committed by left-wing and separatist terrorist groups which are more likely—as it is evident from their objectives (social justice, overcoming of class struggle, end to economic discrimination; cf. Shughart, 2006; Piazza, 2011) shaped by their respective ideologies—swayed by socio-economic improvements than their religious counterparts. For another, during the observation period of this paper all countries in the sample were stable democracies. This makes it plausible that terrorism in this part of the world is more strongly rooted in differences in economic rather than political conditions. The findings of this paper suggest that home-grown terrorism in Western Europe is (partly) rooted in poor socio-economic conditions and may consequently be fought by higher spending in certain social policy fields and by more generous welfare regimes.

Chapter 3, *Causal Linkages between Domestic Terrorism and Economic Growth*, is a joint work with Thomas Gries and Tim Krieger. A nearly identical version of it was published in *Defence and Peace Economics* 22(5), 493-508. An earlier version of this paper was presented at the 9th Annual Meeting of the European Public Choice Society (Athens, 2009). This contribution studies the relationship between domestic terrorism and economic growth for seven Western European countries for the post-World War II period (ca. 1950-2004). It uses statistical tools of time-series analysis to study these causal interactions.

First, and most importantly, this contribution adds to the existing research by providing an explicit assessment of the causal relationship between terrorism and socio-economic

conditions, where the latter is measured in terms of economic growth (a socio-economic variable that is easy to interpret). This makes it possible to fully consider the (potentially complex) causal interaction between these two variables without assuming a "fixed" direction of causation.

Second, this contribution uses data on domestic terrorism, making it possible to assess to what extent it is rooted in economic conditions and produces economic damage, also in comparison to the empirical mainstream that focuses on the causes and effects of transnational terrorism.

Third, it takes due account of heterogeneity in the determinants and consequences of domestic terrorism. Methodologically, through a time-series approach (using the Hsiao-Granger method to test for causality) the causal dynamics of the terrorism-growth nexus are analyzed separately for each country in the sample. This makes it possible to more closely identify those country-specific variables which may influence the causal effect of growth on terrorism (e.g., the responsiveness of terrorist groups in different countries to socio-economic change) and the causal impact of terrorism on economic growth (e.g., the macroeconomic resiliency of the attacked economies). To preview the empirical results of this paper, it finds that in bivariate settings the impact of economic performance on domestic terrorism is very strong, while in trivariate settings the impact of economic growth on terrorism diminishes. Considering the other direction of causation, terrorism is almost never found to causally influence growth in bivariate and trivariate specifications. This indicates—consistent with the findings of Chapter 2—that economic conditions matter to domestic terrorism in several Western European countries, whereas all attacked economies have been successful in adjusting to the threat of terrorism. The latter finding also suggests that the results presented in Chapter 2 are not driven by reverse causation, further strengthening confidence in the findings of the second chapter.

Chapter 4, *Economic Performance and Terrorist Activity in Latin America*, is a joint work with Thomas Gries. A virtually identical version of this paper is due to be published in *Defence and Peace Economics* (http://dx.doi.org/10.1080/10242694.2012.656945). This

study examines the links between economic performance and terrorism for 18 Latin American countries from 1970 to 2007. In contrast to Chapter 3, it uses statistical tools for panel data (panel unit root tests, panel Granger causality tests) to analyze these linkages.

First, and similar to Chapter 3, this contribution directly tests for the causal relationship between economic growth and terrorism, albeit for a different part of the world and through the use of different econometric techniques (panel unit root tests, panel Granger causality tests, negative binomial regressions). This again makes it possible to consider the (potentially complex) causal interaction between terrorist and economic activity.

Second, it uses data on total (i.e., domestic and transnational) terrorism for this analysis ought to provide a more consistent picture of the causal dynamics between short-run economic performance and terrorist activity. This is different to the empirical mainstream which has mainly focused on the causes and effects of transnational terrorism.

Third, by focusing the analysis on Latin America, it is possible to contrast the findings of this study with the large-N (i.e., global) evidence on the causes and consequences of terrorism. On the one hand, terrorist activity in Latin America has been predominantly carried out by left-wing groups which have clearly emerged in response to economic injustice and exploitation and are geared towards socio-economic change (e.g., Lopez, 1988; Shughart, 2006). This may make terrorism in Latin America more responsive to economic progress than terrorism in other parts of the world. On the other hand, the relative economic-institutional backwardness may make Latin American economies more vulnerable to economic damage from terrorism, e.g., in comparison to Western European economies which Chapter 3 examined.

Fourth, the empirical approach of Chapter 4 does not only make it possible to contrast its findings with the global evidence, but also to study whether differences *within* Latin America are a source of causal heterogeneity. Specifically, in this study it is argued that the overall level of economic development may be a driver of such heterogeneity. To preview the empirical findings of this analysis, it is indeed found that during the period of observation growth reduced terrorism in the less developed (poorer) but not in the higher

developed (richer) Latin American economies. A series of negative binomial regressions delivers additional support for this finding, while also identifying further determinants of terrorism (political instability, population size, the dynamics of the Cold War etc.) which also seem to matter to terrorism in Latin America. Considering the other direction of causation, no evidence is found that terrorism had a causal effect on economic growth, implying homogeneous non-causality, no evidence of reverse causation or endogeneity and a sufficiently high level of economic resiliency to the adverse effects of terrorism.

Chapter 5, *Concluding Remarks*, provides a summary of the findings of this doctoral thesis. It also discusses the implications of this thesis for future research on the socio-economic causes and consequences of terrorism. A special emphasis is put on the political implications that follow from the results of this thesis.

Chapter 2

Terrorism in the Worlds of Welfare Capitalism

This chapter is a joint work with Tim Krieger. It is slightly revised version of a paper that was published in 2010 in the Journal of Conflict Resolution 54(6), 902-939.

2.1 Introduction

Many Western European countries have suffered from major episodes of terrorist activity on their own soil since the 1950s (Engene, 2007). While such terrorism has resulted in thousands of victims, it has also entailed notable negative economic and political effects.[1] As these direct and indirect costs are considerable, this contribution seeks to investigate the determinants of home-grown (homeland) terrorism in Western Europe. In particular, we want to extend the academic discourse on a potential *terrorism-welfare policy nexus* which was introduced by Burgoon (2006). He argues that social policies may indirectly reduce terrorist activity by removing several socio-economic causes of terrorism (e.g., poverty, inequality, social dissatisfaction). He offers an empirical analysis of this hypothesis, finding that welfare efforts are indeed linked to a reduction in the production of and vulnerability to transnational terrorism. His analysis has attracted some criticism, especially by Crenshaw et al. (2007) who point at potential flaws in Burgoon's argumentation and econometric procedure. We take Burgoon's analysis as a starting point of our investigation, keeping

[1] Several studies analyze the impact of terrorism on economic and political factors in Western Europe. See Gaibulloev and Sandler (2008) for a study of the negative effects of terrorism on economic growth in Western Europe. See Enders and Sandler (1996), Abadie and Gardeazabal (2003) and Greenbaum et al. (2007) for studies that investigate the negative influence of terrorism on tourism, production, investment and employment in Spain, Greece and Italy. See Indridason (2008) for the disruptive effects of terrorist activity on political systems in Western Europe.

in mind already raised objections by Crenshaw et al. (2007) to improve our empirical approach. We add to and complement Burgoon's analysis by, inter alia, concentrating on domestic (home-grown) instead of transnational terrorism (as we expect a particularly strong relationship between social systems and domestic terrorism), by employing a variety of spending variables to improve the analysis of the mechanics of the terrorism-welfare policy nexus, and by analyzing (for the first time) institutional aspects of welfare regimes and their influence on terrorism.

We scrutinize the effect of welfare policies (indicated by social spending and welfare regime variables) on home-grown terrorism in Western Europe during the 1980-2003 period, using time-series cross-sectional data for 15 countries. A focus on the mature welfare states of Western Europe is especially interesting because for this part of the world detailed data and previous empirical work is available which allows us to investigate the terrorism-welfare policy nexus in much more detail, e.g., by looking at specific forms of social spending and welfare state design and their effects on terrorism. At the same time, home-grown terrorism in Western Europe has been carried out in large parts by ethnic-nationalist and left-wing groups which are (in contrast to religious groups) much likelier to respond to social policies (Crenshaw et al., 2007). Our first hypothesis is that *higher social spending* reduces terrorist activity by improving a variety of short-run and long-run socio-economic conditions, net of other factors contributing to the genesis of terrorism and potential terror-enhancing effects of social spending. In an economic sense higher social spending translates into higher opportunity costs of terrorism, e.g., as poverty and inequality diminish or additional economic alternatives open up. Our second hypothesis is that certain *worlds of welfare capitalism* are (independent of the actual level of social spending) less vulnerable to terrorism because they are more successful in ameliorating poor short-term and long-term socio-economic conditions which may otherwise provide breeding grounds for terrorism. The latter hypothesis is linked to the influential work of Esping-Andersen (1990). Similar to our first hypothesis, we argue that policy success differs across welfare regimes, thereby affecting the opportunity costs of terrorism in different ways.

As our main results we find that higher social spending in certain fields—on health, unemployment benefits and active labor market programs—is associated with a significant reduction in homeland terrorist activity. However, there are some policy fields where more spending does not universally translate into less terrorism (e.g., public housing). Spending in fields close to the "typical" terrorist (who may be young and lack economic opportunities, or who is sympathetic towards this group of people) generally discourages terrorist activity more effectively. Moderate evidence indicates that the various worlds of welfare capitalism are prepared to deal with homeland terrorism in different ways. Welfare regimes that provide low levels of market dependence (i.e., the social-democratic worlds of welfare capitalism) are on average less prone to terrorist activity than more liberal systems (which offer higher levels of market dependence). Our findings are robust to a variety of specifications. In an extension to our empirical work we show that imported transnational terrorism (which originates, e.g., in the Middle East) is not discouraged by higher social spending or a more social-democratic welfare regime.

The remainder of this contribution is organized as follows. After this introduction we provide an in-depth discussion of potential links between social policies and terrorism. Afterwards, we present the data and the empirical framework used for our investigation, before providing our empirical findings. In the last section we discuss and sum up our findings.

2.2 Welfare Systems and Terrorism

As noted in the introduction to this doctoral thesis, economic theory identifies terrorists as rational actors who use violence as a means to achieve political goals. The terrorists' calculus (and the calculus of their supporters) includes the costs, benefits and opportunity costs arising from terrorist activity, depending on which the actual level of terrorism is chosen (e.g., Frey and Luechinger, 2003). Country-specific factors may influence these calculi. Existing empirical research has analyzed the role of, inter alia, democracy (Li, 2005), economic integration (Li and Schaub, 2004), geographical proximity to terrorism

hot spots (Braithwaite and Li, 2007) and identity conflict (Basuchoudhary and Shughart, 2010) in swaying the patterns of terrorism.[2] We control for several of these factors in our empirical analysis. However, at the same time we acknowledge that there is no academic consensus on the importance of certain country-specific factors in impacting the production of terrorism. For our country sample some explanatory approaches do not appear to fit. For instance, this is the case with the role of some political factors (repression or state failure) as terrorism catalysts.

In this contribution we focus on *social spending* as a potential (country-specific) determinant of terrorism. We argue that social spending influences intervening socio-economic variables in ways that diminish terrorist activity because these very variables are among the determinants of terrorism. In short, social spending is anticipated to improve short-run economic conditions (e.g., growth and employment), ameliorate poor structural socio-economic conditions (e.g., poverty and inequality), reduce economic insecurity and increase overall social satisfaction. An improvement in these socio-economic conditions makes terrorism less attractive as it generally increases the opportunity costs of violence. We connect social spending to terrorism in more detail below and summarize our line of argumentation in Figure 2.1.[3]

Furthermore, we argue that certain *welfare regimes* (certain *worlds of welfare capitalism*, as Esping-Andersen (1990) calls them) affect terrorist activity, *independent of the actual volume of social spending*. Welfare regimes may assign different roles to the state, the market and the family, leading to different degrees of market dependence and forms of social structuring. Depending on the level of market dependence and the configuration of social structuring, short-run and long-run socio-economic conditions, insecurity and social

[2] Bird et al. (2008), Gassebner and Luechinger (2011), Kis-Katos et al. (2011) and Krieger and Meierrieks (2011) offer overviews of potential terrorism causes and related empirical evidence.

[3] The discussion of the relationship between social spending and terrorism draws in parts on Burgoon (2006). We complement and readjust his argumentation with respect to the scope of our empirical analysis. For instance, Burgoon (2006) argues that social policies may reduce religious and political extremism by "crowding out" welfare activities by terrorist groups (where the social policies of Hamas in the Gaza Strip may serve as an example). We do not consider the link between social policies and terrorism for Western Europe because their mature welfare systems do not allow for a "welfare take-over" of this kind.

satisfaction are influenced in different ways, in turn swaying the terrorists' calculus and the calculus of their supporters in different ways. Our main hypothesis is that low levels of market dependence and egalitarian forms of social structuring (which are typically associated with the social-democratic world of welfare capitalism) ought to lower terrorism by impacting its opportunity costs through the aforementioned intervening variables. We give a more in-depth discussion of this point below and illustrate our argumentation in Figure 2.2.

2.2.1 Social Spending and Terrorism

Social spending may positively affect short-run economic conditions (e.g., economic growth, employment and investment). Midgley and Tang (2001) offer a variety of channels through which such effects may emerge. For instance, spending on health or active labor market programs may be considered as an investment in human capital which in turn stimulates growth and employment.[4] Social spending on family programs may also remove obstacles for female economic participation, again promoting economic performance. Harris (2002) argues that certain forms of social spending (e.g., on health or labor market programs) may accelerate aggregate productivity and stimulate labor market participation, innovation and investment. De Grauwe and Polan (2005) furthermore find that countries with developed welfare systems exhibit high international competitiveness, so there is no evidence to indicate that social spending decreases a country's international economic position. The positive effect of social spending on short-run economic conditions may feed through to a reduction in terrorism. Blomberg and Hess (2008a) find that economic success reduces the likelihood of terrorist activity in a country. Blomberg et al. (2004a) show that slow growth is one important factor leading to transnational terrorist attacks. A number of further studies (e.g., Muller and Weede, 1990; Braithwaite and Li, 2007) also find that economic

[4] Alternatively, the welfare state can be seen as an institution offering insurance against life-long career risks, allowing for any type of risky investment, e.g., in individual human capital (Sinn, 1995). Thus, a welfare state can again be seen as an institution promoting long-run economic performance.

success is a disincentive to terrorist activity.[5] This evidence suggests that social spending may potentially decrease terrorist activity through its positive effect on short-run economic factors which shape the opportunity costs of terrorism.

There may also be a terror-reducing effect of social spending via an amelioration of long-run socio-economic conditions. The evidence indicates that social spending has been a fundamental determinant of poverty reduction, particularly in developed welfare states (e.g., Kenworthy, 1999; Förster and Pearson, 2002; Brady, 2005). Similarly, welfare spending has been associated with a reduction in income inequality (Caminada and Goudswaard, 2001; Förster and Pearson, 2002). Increased welfare spending may reduce poverty and inequality, e.g., by providing health and unemployment benefits or financial support for families and the elderly. The empirical evidence also indicates that low income and high inequality are conducive to violence in societies (e.g., Muller and Seligson, 1987; Blomberg et al., 2004a; Blomberg and Hess, 2008a). For instance, terrorist organizations may use poor socio-economic conditions as a convenient platform to muster support. By its positive effect on structural socio-economic conditions, social spending may undermine the recruitment efforts or support of terrorist organizations, thus indirectly contributing to a reduction in terrorism.

Social spending may also affect terrorist activity through variables such as economic security or satisfaction with life (happiness). These factors are to some extent associated with the short- and long-run socio-economic conditions discussed above, but also transcend them as they take a more "holistic" perspective on individual well-being, which independently affects terrorist activity. For instance, a recession may trigger terrorism by making terrorism more attractive for those hit by the economic crisis (e.g., the unemployed). At the same time, a recession also changes the perceptions of risk, fear and satisfaction of

[5] As already stressed in the introduction to this doctoral thesis, there is, however, a body of research that argues otherwise. For instance, Abadie (2006) and Kurrild-Klitgaard et al. (2006) find that political development is more important to the genesis of terrorism. While a number of political factors (e.g., repression or state failure) obviously do not matter to the production of terrorism in our country sample, we carefully control for the influence of other political factors in our empirical analysis. Our analysis consistently finds that social policies exert a negative influence on terrorism, net of a variety of political indicators.

those individuals that are actually unaffected by the crisis. This rather "diffuse" dissatisfaction may also produce terrorism (Frey and Stutzer 2005). Social spending may counter the latter effect. As shown by Di Tella et al. (2003) and Pacek and Radcliff (2008a), higher levels of social spending are associated with higher levels of satisfaction. Di Tella et al. (2003) specifically refer to the positive effect of unemployment benefits as one form of spending that reduces insecurity and increases satisfaction. Generally, social spending that secures against perceived risks (e.g., spending on health or old-age benefits) may increase life satisfaction. Through its positive effects on individual perceptions of insecurity and dissatisfaction, social spending may eventually reduce terrorism that is rooted in these very "holistic" conditions.

Besides the positive effects of social spending on terrorism via the channels discussed above, it is also possible that social spending spurs terrorism. On the one hand, social spending (e.g., unemployment benefits) may enable individuals to commit terrorism by providing them with free time and financial resources (Burgoon, 2006). That is, terrorism may positively affect the capacities of those organizing and perpetrating terrorism. On the other hand, social spending may create grievances. The net contributors to a redistributive system (the taxpayers) may feel betrayed because they have to give away too much of their resources.[6] The net receivers may feel betrayed because society does not seem to support them enough. Possibly, both forms of resistance against welfare spending may translate into increased terrorist violence. However, we side with Burgoon (2006) and argue that the terror-enhancing effects of social spending via increased terror capacities or the creation of spending-related grievances are rather marginal.

In Figure 2.1 we sum up how social spending may influence terrorist activity. Based on the discussion before, we verbalize our first hypothesis (H_1):

Hypothesis (H_1): Social spending augments short-run economic conditions, improves

[6] The form of taxation may also matter to the genesis of grievances. For instance, financing social spending by a value added tax may amplify grievances among those most strongly taxed (e.g., the lower-middle class). A more detailed analysis of the linkages between taxation and terrorism may be an interesting avenue of future research.

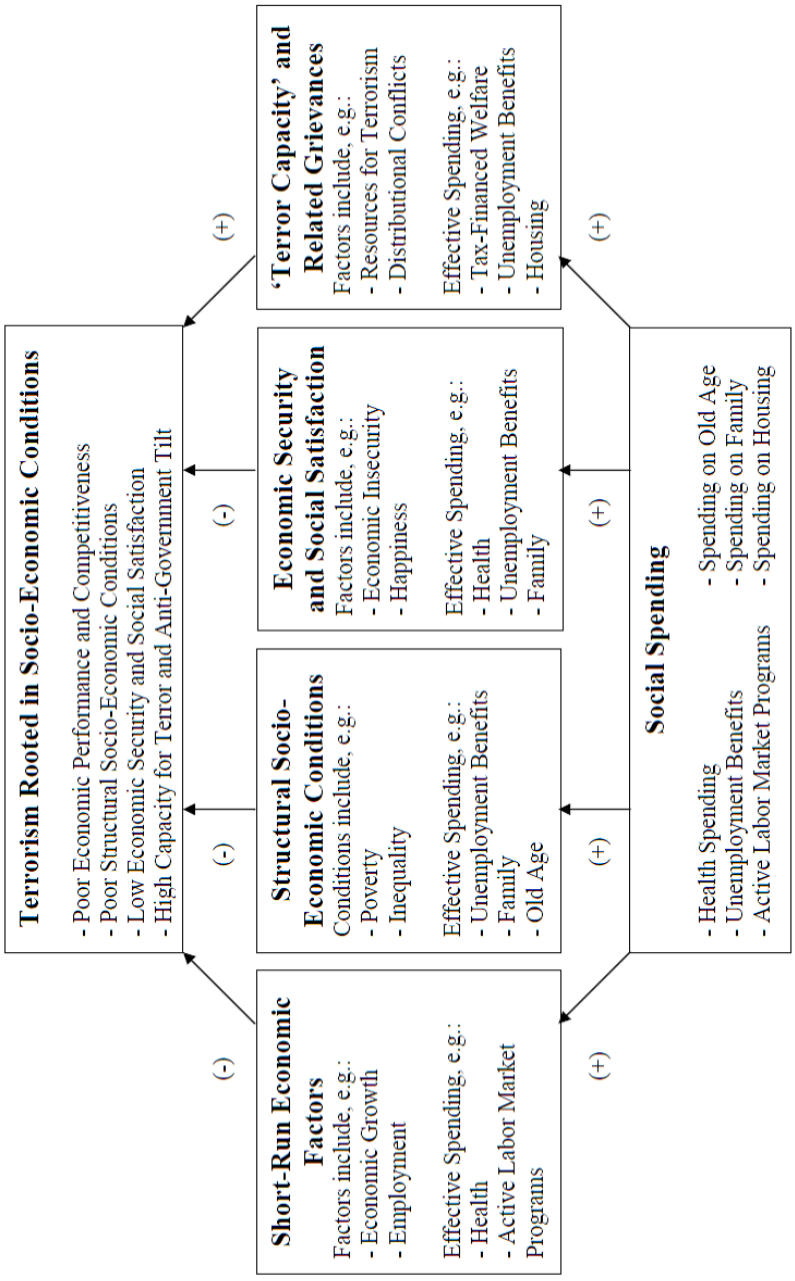

Figure 2·1: Welfare Spending and Terrorist Activity

poor structural socio-economic conditions, reduces economic insecurity and leads to generally higher satisfaction with life. Because of the effect of social spending on these intervening variables, terrorism production (ceteris paribus) should be lower the higher the level of social spending in a given country due to higher opportunity costs of terrorism.

2.2.2 The Worlds of Welfare Capitalism and Terrorism

Previously, we argued that social spending reduces terrorist activity through a number of channels. An empirical assessment of this hypothesis requires us to study the effect of spending variables on terrorist activity. Spending, however, does not necessarily tell the complete story about a welfare regime. For instance, welfare spending on unemployment benefits may increase (as unemployment increases) but the state may at the same time cut unemployment benefit programs (meaning that the welfare state's generosity towards an individual on welfare decreases). This example illustrates that spending variables may not be good indicators of welfare state commitment (cf. Scruggs and Allan, 2006). Welfare regimes may, inter alia, differ in terms of the rules of access to the welfare system, the conditions under which one receives social support and the role of the state, the market and the family. These differences may be independent of the respective levels of social spending.

Although not exempted from criticism, Esping-Andersen (1990) offers a popular characterization of welfare regimes that is independent of the actual level of social spending, namely the *Worlds of Welfare Capitalism* view.[7] This view focuses on two fundamental welfare state dimensions: decommodification and social stratification. *Decommodification* refers to the degree to which citizens are dependent on the labor market to keep up a certain standard of living. In social systems that offer generous welfare services, the degree of market dependence is smaller (decommodification is higher) than in systems that offer

[7] We refer to the excellent survey of Arts and Gelissen (2002) for a broader discussion of the related literature.

only minimum compensations. *Stratification* refers to the societal structuring fostered by welfare policies. Social policies may aim at conserving a society's status quo, at unleashing potential for individual success or at overcoming class differences. Social systems may rely on narrow or broad solidarities, depending on which concept fits in better with underlying ideas of social structuring. Esping-Andersen (1990) identifies three "ideal" worlds of welfare capitalism for Western Europe along the decommodification and stratification dimension. The *liberal type of welfare capitalism* emphasizes the importance of the individual and of the market (meaning a low level of decommodification), where the primacy of the market usually leads to a social stratification where a minority is dependent on low levels of state benefits (implying social inequality). In *corporatist welfare regimes* benefit recipients may maintain their former level of income for some time, where benefits usually increase with previous contributions to the system (implying a moderate level of decommodification). Such regimes tend to preserve a "natural" social order (e.g., with respect to the role of the family and women in society). *Social-democratic welfare regimes* aim at low levels of market dependence (meaning a high level of decommodification) and promote the ideas of universality and broad solidarity (implying social equality). According to Esping-Andersen (1990), e.g., the United Kingdom is a prototype of the liberal world of welfare capitalism. Germany and Italy are "ideal" conservative worlds of welfare capitalism. The Scandinavian countries are prototypes of the social-democratic system.

Our main hypothesis is that welfare regimes that promote low levels of market dependence and high levels of social equality are better prepared for swaying socio-economic conditions in ways that reduce terrorism by affecting the opportunity costs of terrorism. More plainly, we argue that in particular social-democratic welfare regimes are less prone to terrorist activity. Figure 2.2 illustrates our reasoning. Below, we discuss in more detail how different welfare regimes may influence terrorism. We then formulate our second hypothesis accordingly.

At times, more liberal welfare regimes have been argued to spur economic growth, employment and international competitiveness, outperforming the conservative and social-

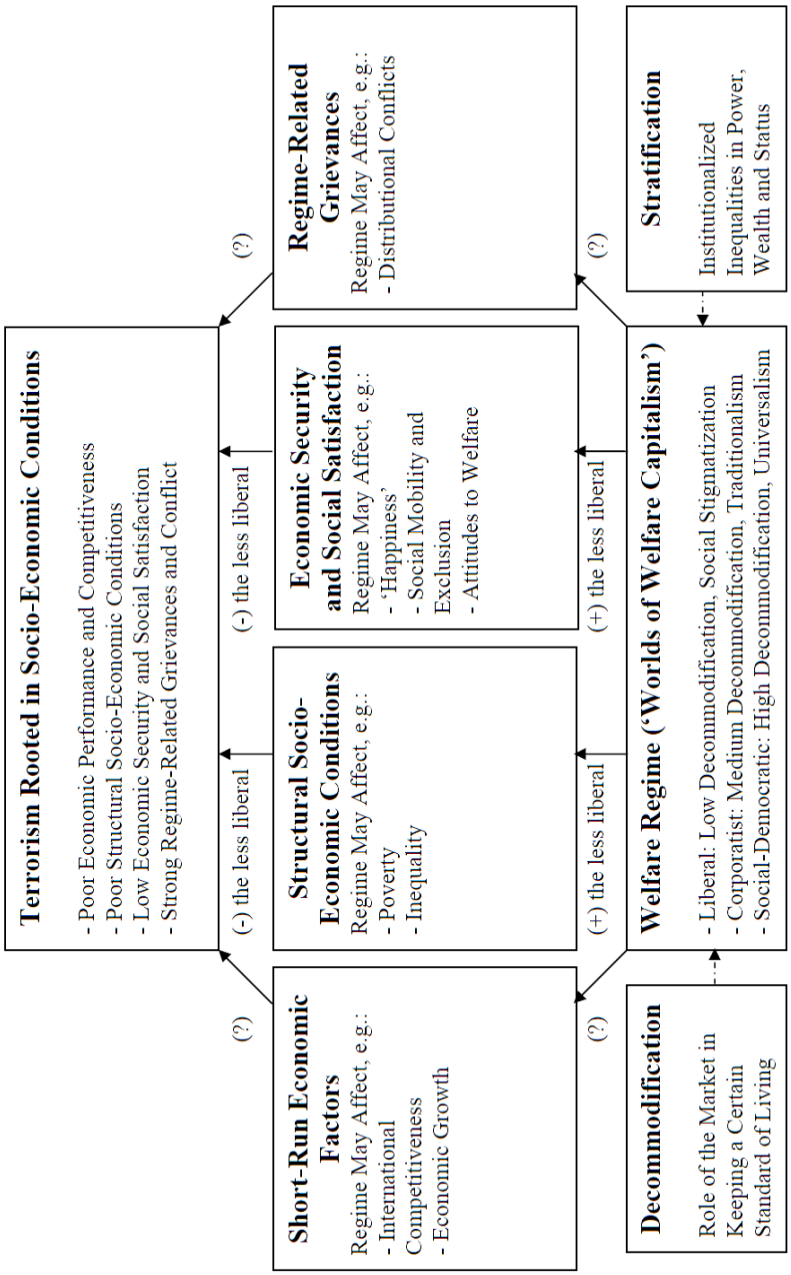

Figure 2·2: Welfare Regimes and Terrorist Activity

democratic worlds of welfare capitalism. For instance, advantages for liberal regimes are argued to come, e.g., from fiscal discipline, flexible labor markets or a better attraction of capital (Bernard and Boucher, 2007). However, Bernard and Boucher (2007) find that the different worlds of welfare capitalism use different strategies to achieve employment and that no regime is particularly well-suited to improving short-run economic conditions. Similarly, Headey et al. (2000) do not find that liberal regimes achieve higher growth or employment rates. That is, there is little evidence that liberal regimes improve short-run economic conditions more effectively than their conservative or social-democratic counterparts. Furthermore, there is no evidence of a trade-off between economic efficiency and welfare state generosity (Headey et al., 2000). Consequently, we cannot assess which welfare regime is less prone to terrorism rooted in poor economic performance, unemployment or low economic competitiveness. However, welfare regime characteristics may still impact long-run socio-economic conditions or social satisfaction, which explains why some welfare regimes are more vulnerable to terrorism than others.

That said, different types of welfare regimes may have distinct effects on poverty and income inequality reduction. A substantial body of empirical literature argues that more generous welfare regimes perform better (Green et al., 1994; Headey et al., 1997; Kenworthy, 1999; Rueda and Pontusson, 2000; Fouarge and Layte, 2005; Scruggs and Allan, 2006). Further studies also find that more generous regimes are better prepared for countering social exclusion and resource deprivation, thereby reducing more than just the purely material forms of socio-economic inequality (Tsakloglou and Papadopoulos, 2002; Muffels and Fouarge, 2005). In general, these results convincingly suggest that social-democratic welfare regimes (the most generous regimes) outperform the corporatist and liberal ones, thereby being less prone to terrorism rooted in poor structural socio-economic conditions.[8]

[8] Whether corporatist or liberal welfare states are better at reducing poverty and inequality is to some extent open to debate. While liberal welfare states tend to directly target benefits at the poor and provide equal public transfers to the needy, Korpi and Palme (1998) provide evidence that this strategy is in fact less likely to reduce poverty and inequality compared to providing earnings-related benefits, as most corporatist (continental) European countries do. See also Conde-Ruiz and Profeta (2007) and Lefèbvre (2007) for further evidence regarding this issue.

Different welfare regimes may also produce different levels of social satisfaction and economic security, thereby indirectly affecting terrorism that is rooted in general dissatisfaction and insecurity. Again, the evidence indicates that welfare regimes offering low levels of market dependence and universal access to their social systems are able to generate higher levels of satisfaction and security (Radcliff, 2001; Di Tella et al., 2003; Pacek and Radcliff, 2008b). This suggests that social-democratic welfare regimes are less likely to breed terrorism due to social dissatisfaction. For instance, in the social-democratic world of welfare capitalism the possibility of unemployment is less threatening. High levels of decommodification make it possible to sustain a comparatively high standard of living, making it also less likely to lose social status quickly. If we accept that fear, insecurity and other "diffuse" feelings may drive violence (Frey and Stutzer, 2005), then such violence is less likely to be produced in more generous welfare regimes.

Nevertheless, it may also be possible that the existence of a specific welfare state regime (including the social-democratic one) itself produces grievances that translate into violence. In particular, distributional and "insider-versus-outsider" conflicts may arise, where it is a priori unclear which welfare regime is more prone to these kinds of conflicts. First, one may argue that any kind of tax-financed welfare program produces distributional conflicts, dividing societies into net contributors and net beneficiaries of a welfare state. By trend, one may hypothesize that more generous regimes produce higher grievances among the former group, whereas more liberal (i.e., less generous) regimes create grievances among the latter. Second, welfare regimes may generate intergenerational conflict. For instance, some evidence indicates that large pay-as-you-go pension systems (which are typical of corporatist countries) systematically reduce fertility (Cigno and Rosati, 1996), thereby shifting political influence in favor of the elderly. This may lead to grievances among the younger generation. Third, corporatist welfare states in particular often suffer from particularly high labor market rigidity. Strong protection for the employed combined with huge barriers to labor market entry divides the labor force into privileged "insiders" and precarious "outsiders", including, e.g., young and immigrant workers (Esping-Andersen,

2003). In fact, Rueda (2005, 2006) shows that even in social-democratic welfare regimes governments may be tempted to introduce active labor market policies that benefit insiders while ignoring the interests of outsiders as this serves their electoral goals best. This may produce grievances among the "outsiders", in consequence possibly fostering violence.

We provided evidence to indicate that welfare regimes that promote low levels of market dependence and high levels of social equality are generally more able to sway certain socio-economic conditions—i.e., the intervening variables—in ways that reduce terrorism by increasing its opportunity costs. Although some terror-enhancing effects of welfare regimes were identified, we believe that they are in general outweighed by the terror-dampening effects of these very regimes. Our second main hypothesis (H_2) is thus:

Hypothesis (H_2): Different welfare regimes differently affect short-run economic conditions, structural socio-economic conditions, economic security and satisfaction with life, independent of the actual level of social spending. Terrorism production (ceteris paribus) ought to be lower in countries whose welfare regimes are characterized by high levels of market independence and social equality because the effect of such regimes on some of the aforementioned intervening variables is most beneficial.

2.3 Econometric Methodology

2.3.1 Variables and Data

Dependent Variables

We obtain raw data on terrorist activity from the *Global Terrorism Database* (*GTD*) of LaFree and Dugan (2007). For our main analysis we consider actions by *known domestic terrorist organizations*. Given that media attention is a major goal of terrorist organizations, we do not consider actions perpetrated by unknown groups or individuals (e.g., we do not count killing sprees by individuals as acts of terrorism).[9] We only consider do-

[9] At the same time, we avoid counting ordinary criminal acts as acts of terrorism. When we process the raw GTD data, we also filter out any event data that can be considered as criminal rather than terrorist activity (e.g., Mafia activity in Italy). While it is true that criminal and terrorist activities may overlap and

mestic groups because they should react most strongly by far to changes in socio-economic conditions initiated by social policies. Also, domestic terrorism is a more common phenomenon than transnational terrorism (Sanchez-Cuenca and De La Calle, 2009). According to Engene (2007), most domestic terrorist activity in Western Europe is conducted by ethnic-nationalist (e.g., *ETA*) or left-wing groups (e.g., *Action Directe*). Note that religiously motivated terrorism does not play a role in Western Europe because we only consider home-grown terrorism during the 1980-2003 period.

We use two definitions of domestic terrorism. We consider *purely domestic terrorism* (terrorism by domestic groups aimed only at domestic targets). Here, our analysis is linked to the common differentiation between domestic and transnational terrorism. This differentiation has, however, been criticized. We therefore also investigate *all terrorism taking place in one country as well as originating in this country* (terrorism by domestic groups against domestic and international targets). Here, we side with Sanchez-Cuenca and De La Calle (2009) who argue that the nationality of a terrorist target may not matter, but that it is more important that a terrorist act is conducted by a terrorist organization in its natural territory.[10]

Based on our two definitions of homeland terrorism, we construct a total of four dependent variables. First, we use the *number of terrorist attacks* to indicate the frequency of purely domestic and total domestic terrorism. Second, we also investigate the ferocity of purely domestic and total domestic terrorism, indicated by the *sum of people injured or killed in terrorist attacks*.

All of these four terrorism incident and victim variables are event counts. For our analysis we choose 15 Western European countries that experienced homeland terrorist

even converge (e.g., Dishman, 2001; Makarenko, 2004), they differ with respect to their main motivation, where the former serves mainly commercial purposes, while the latter has a clear political dimension.

[10] In order to construct terror variables for total homeland terrorism, we, e.g., count all attacks by ETA in Spain (its homeland), regardless of the nationality of the target of these attacks. By contrast, we do not investigate imported transnational terrorism conducted by groups operating outside their natural territory. (e.g., Palestinian groups) in our main analysis. Instead, we focus on this imported transnational terrorism in an extension of our empirical work. Note that for imported terrorism religious ideology (e.g., Islamist terrorism) may very well matter.

Figure 2·3: Terrorist Activity in Western Europe, 1980-2003

activity between 1980 and 2003. The countries most hit were the United Kingdom, France, Greece, Italy, Spain and Germany.[11] Figure 2.3 gives an overview of the frequency and ferocity of purely domestic terrorism between 1980 and 2003.[12] In total, there were almost 5000 terrorist attacks which claimed approximately 8400 victims.

Independent Variables

To test our hypotheses of influences of welfare policies on terrorism, we employ a variety of measures in two categories. First, we use social expenditure variables. Second, we use indicators that characterize the design of welfare systems and their affiliation with the broad worlds of welfare capitalism clusters. Additional information on all our independent variables is given in the appendix to this chapter.

[11] The other countries in our sample are Austria, Belgium, Denmark, Ireland, the Netherlands, Norway, Portugal, Sweden and Switzerland.

[12] Note that the patterns of total homeland terrorism are very similar. The correlation between the number of purely domestic and total terrorist attacks is 0.99. The correlation between the number of victims from purely doemstic terrorism and total homeland terrorism (including international victims) is 0.97.

Our overall measure for social spending is *total social public expenditure* (*SOCEXP*).[13] We also consider spending on *public health* (*HEALTH*), *unemployment* (*UNEMP*) and *active labor market programs* (*LABOR*). In line with our first hypothesis we expect higher spending to generally coincide with a decrease in terrorism, e.g., by means of increased economic security or participation, or augmented social stability and satisfaction. As "typical" terrorists (and their supporters) are usually young and without much economic perspective (Ehrlich and Liu, 2002), we expect the effects of HEALTH, UNEMP and LABOR to be particularly strong because they are strongly linked to the socio-economic conditions of potential terrorists and their supporters. We also check for the impact of further expenditure variables. Here, we incorporate public expenditure on *old age* (*OLDAGE*), the *family* (*FAMILY*) and on *public housing* (*HOUSE*). These spending variables may be less strongly linked to the "typical" potential terrorists' socio-economic conditions and thus less likely to be linked to violence propensity.

As argued before, the analysis of social spending patterns does not necessarily provide a complete picture of the terrorism-welfare nexus. Esping-Andersen (1990) notes that it is not the amount of public spending per se but its effect (policy outcome) that matters. This effect becomes apparent in the two dimensions (decommodification and social stratification) we discussed earlier. Decommodification may be measured by an index computed using information on pension, unemployment and sickness welfare programs (Sruggs and Allan, 2006). Specifically, these programs are evaluated, inter alia, with respect to their coverage, duration of benefits and qualifying rules. Higher index values coincide with higher decommodification and thus less market dependence. Scruggs (2004) provides a *decommodification score* using new data based on the methodology proposed by Esping-Andersen (1990). We use this decommodification score (*DEMSCORE*) as a measure of market independence. Decommodification is expected to be particularly high in the social-democratic world of welfare capitalism (Esping-Andersen, 1990). We also use data on *unemployment replace-*

[13] Note that there is no common trend of spending patterns observable for our country sample between 1980 and 2003, based on the SOCEXP variable. This should reduce the possibility of detecting only a spurious relationship between social spending and terrorism when running corresponding empirical analyses.

ment rates (*UNEM RPL*) from Scruggs (2004) as another indicator of market dependence and welfare generosity. When replacement rates are high, unemployment benefits come closer to the net income of a working individual. Welfare state generosity is again anticipated to be high in the social-democratic world of welfare capitalism. Finally, we also use a measure of social stratification. Following Scruggs and Allan (2008), a possible indicator to assess social stratification is the *degree of universalism* (*UNIV*) which indicates how many individuals (in the labor force or above retirement age) are covered by unemployment or sickness insurance, or receive pensions. According to Esping-Andersen (1990), a high degree of universalism is associated with a social-democratic welfare regime.[14] In line with our second hypothesis we expect a negative relationship between high levels of decommodification and universalism on the one hand and terrorism on the other. More generous regimes should be more successful in discouraging home-grown terrorism, e.g., by means of countering economic or social disenfranchisement. This relationship should be independent of the actual level of social spending.[15]

Controls

We follow Burgoon (2006) and consider a variety of control factors that may not only influence terrorism but also social spending and the welfare regime. Thus, we avoid detecting spurious correlations. We choose controls that account for economic, political, demographic and systemic factors. Information on data measurement and sources is given in the appendix to this chapter.

Trade openness may influence terrorist activity by its effects on economic growth, inequality and income levels (Li and Schaub, 2004). Blomberg and Hess (2008a) find that higher levels of trade openness reduce the likelihood of transnational and domestic ter-

[14] Due to missing panel data it is not possible to construct and employ the other stratification measures proposed by Esping-Andersen (1990). See Scruggs and Allan (2008) for a discussion of this issue.

[15] The correlation between total social spending (SOCEXP) and DEMSCORE is 0.29. The correlation between SOCEXP and UNEM RPL is 0.49, and the correlation between SOCEXP and UNIV is 0.02. This indicates the relationship between social spending and welfare regime variables is not very strong, so an independent analysis of the effect of both types of variables on terrorism is justified.

rorism. Economic integration may reduce grievances associated with poor economic conditions, consequently reducing terrorism building on such grievances. At the same time, open economies face external risks from world market fluctuations. This increases demand for more universal social protection provided by the government (Rodrik, 1998).

Voter turnout may be another variable influencing terrorism and social spending. On the one hand, democratic participation may, inter alia, make it more costly for terrorist groups to find new members and popular support, given that dissent may be voiced non-violently and cost-efficiently by democratic means (Li 2005). On the other hand, higher voter turnouts may also coincide with increased political participation of underprivileged voters demanding an increase in social spending and a more universal form of social protection (Hicks and Swank, 1992).

Left-wing governments may also influence the patterns of terrorism. Burgoon (2006) argues that the presence of left-wing governments should make terrorism less likely, as left-wing parties represent disenfranchised social groups more strongly. When such groups are able to enforce their goals politically, they are expected to resort less to violence. This representation of the underprivileged is likewise expected to increase social spending and to produce more egalitarian social policy outcomes (Allan and Scruggs, 2004).

Electoral fractionalization (political competition) may mean that social tensions that manifest themselves in a fractionalized electorate abound in a country. Such cleavages may translate into terrorist violence (Piazza, 2006). However, in stable democracies political plurality needs not necessarily lead to more violence but may, in contrast, crowd out support for violent fringe groups. Political competition may also influence welfare spending and the goals of welfare policies. Political platforms change when competition is high. Spending is expected to increase with competition as policy outcomes are anticipated to become more egalitarian (Hicks and Swank, 1992).

Population size is almost always positively associated with terrorism in empirical analyses (e.g., Li and Schaub, 2004; Burgoon, 2006). Larger populations should make monitoring for governments more expensive, while making recruitment for terrorist groups less costly.

More plainly, terrorism as a random event is more likely in a larger country. Also, population size is named as a factor strongly explaining social spending and policy patterns (Rodrik, 1998)

The variable *population over 65* is considered because older populations are expected to generate less terrorism just as younger populations are anticipated to breed more violence (Ehrlich and Liu, 2002). At the same time, an older population may demand more social spending related to pensions, health or other welfare programs (Lindert, 1996).

Ethnic polarization may also matter. Montalvo and Reynal-Querol (2005) show that ethnic polarization increases the risk of conflict. Similarly, Basuchoudhary and Shughart (2010) argue that identity conflict leads to terrorism. For instance, higher ethnic polarization may coincide with an increased likelihood of struggles over rents, thus increasing the risk of terrorism. Likewise, ethnic polarization may influence the patterns of social spending and policies. For instance, Alesina et al. (2001) argue that racial fragmentation in the U.S. and the underrepresentation of minorities in the political system has led to lower levels of redistribution.

Lastly, we also control for a major systemic change that occurred during our observation period, namely the *end of the Cold War*. The end of the Cold War is perceived as having significantly changed the dynamics of terrorism (e.g., Enders and Sandler, 1999; Robison et al., 2006). For instance, left-wing groups may find it harder to get ideological and financial support given the collapse of Communism, driving down related risks of terrorist activity. At the same time, the end of the Cold War cleared the way for economic internationalization and increased international competition, possibly influencing welfare spending and policies (Levy, 1999). For instance, in the 1990s governments may have altered social systems to enhance international competitiveness.

2.3.2 Empirical Methodology

We run a panel analysis, departing from previous studies which often relied on cross-sectional approaches. We are able to capitalize on cross-sectional information reflecting

differences between countries and on time-series information reflecting dynamics within countries over time. Panel analyses, amongst others, allow for a better control of heterogeneity effects, reduce problems of collinearity and deliver more efficient econometric estimations.

The dependent variables of our model are count variables which assume only discrete, non-negative values. Standard regression models require that the dependent variable be continuous and random. Our dependent variables violate this requirement, making it impractical to use the OLS estimator (Winkelmann and Zimmermann, 1995). For instance, heteroskedasticity, which is inherent in count data, is ignored, which distorts the estimated variances of the regression coefficients relative to their true variances (Gardner et al., 1995; Winkelmann, 2008). Also, using the OLS estimation model means to allow for negative outcomes even though such an outcome is impossible with event-count data (Winkelmann, 2008). Consequently, using such a model may lead to biased and inefficient parameter estimates. Instead, it is advised to use an estimation technique that explicitly takes into account the count properties of our dependent variable, i.e., count-data models. Such models are estimated using the maximum-likelihood estimator which finds the value of the parameter of interest that makes the observed data most probable to have happened (Lawless, 1987; Winkelmann, 2008). The Poisson distribution—the standard distribution used to model count data—assumes that the mean of the distribution of the dependent variable equals its variance (equidispersion) and that the events that make up the distribution are independent. The presence of overdispersion—when the variance of the dependent variable is larger than its mean—leads to consistent, but inefficient estimates (e.g., downward biased standard errors that possibly lead to incorrect statistical inferences) when the event-count is (incorrectly) modelled to be drawn from a Poisson distribution. In the case of overdispersion, it is advised to fit a count-data regression based on negative binomial distribution as an alternative probability model (Gardner et al., 1995). The negative binomial regression model "[...] can be viewed as a form of Poisson regression that includes a random component reflecting the uncertainty about the true rates at which events occur

for individual cases" (Gardner et al., 1995: 399). The negative binomial model also makes use of the maximum-likelihood estimator (Lawless, 1987). It has also been shown to have good properties with respect to, e.g., efficiency and robustness (Lawless, 1987).

As shown in Table 2.1, the variances of our dependent variables are indeed larger than their respective means. Because of this overdispersion, we employ a negative binomial (maximum-likelihood) count model which does not suffer from the inefficiency problems that may result from the use of a Poisson regression model in the presence of overdispersion.[16]

The estimation equation is as follows:

$$Terror_{jit} = \alpha_i + \beta_1 Terror_{ji,t-1} + \beta_2 SOC_{ji,t-1} + \beta_3^{'} X_{i,t-1} + \lambda_t + \epsilon_{it}, \qquad (2.1)$$

where $Terror_{jit}$ is the jth terrorism indicator for country i in period t. $Terror_{ji,t-1}$ is the respective lagged dependent variable. $SOC_{ji,t-1}$ is our jth welfare spending or policy measure for country i in period *t-1*. $X_{i,t-1}$ is the vector of control variables for i in the *(t-1)* lagged form. β_1, β_2 and β_3 are coefficients. λ_t are the fixed time effects (time dummies). ϵ_{it} is the error term.

We let the independent variable and control variables enter the model with *(t-1)* lagged values, as we assume that any changes in these parameters should affect terrorist behavior only after some time. Furthermore, we avoid potential reverse causation problems by lagging all the explanatory variables as this eliminates the correlation between the explanatory variables and the error term.[17] We include a lagged dependent variable in all

[16] We may need to take into account the possibility of excess zeros which may be the actual cause of overdispersion. Zero inflation can cause efficiency problems if not accounted for. Burgoon (2006) argues that zero inflation in the context of terrorism analysis may occur because of systematic differences in the likelihood and causes of terrorist activity. Additionally, zero inflation may be a consequence of under-reporting biases of terrorist activity in countries with low levels of press freedom. Given our data sample for Western Europe during 1980-2003, we see no reason for assuming the existence of systematic differences in terrorist activity across countries or of any substantial under-reporting bias. On these grounds, we abstain from correcting for zero inflation.

[17] Also, it is shown in Chapter 3 of this thesis that economic conditions are usually not causally influenced by terrorist activity. This finding reinforces the argument that the findings regarding the terrorism-welfare policy nexus cannot be driven by reverse causation.

Variable	N*T	Mean	Std. Dev.	Min.	Max.
Purely Domestic Terrorist Attacks	360	13.87	35.35	0	244
Purely Domestic Terrorism Victims	360	23.34	66.19	0	527
Total Domestic Terrorist Attacks	360	15.16	36.37	0	247
Total Domestic Terrorist Victims	360	24.97	68.02	0	528
Transnational Attacks	360	1.86	4.00	0	33
Transnational Terrorism Victims	360	8.09	31.91	0	270
Total Social Public Expenditure	346	22.06	4.83	10.77	36.17
Public Health Expenditure	346	5.56	1.09	2.89	8.48
Unemployment Benefits	343	1.58	1.19	0	5.27
Active Labor Market Spending	310	0.87	0.53	0	2.86
Old Age Spending	346	7.49	2.39	2.24	12.79
Spending on Family	346	2.00	1.10	0.15	4.89
Spending on Housing	322	0.41	0.40	0	1.82
Decommodifcation Score	276	7.92	2.06	2.89	11.63
Unemployment Replacement Rate	269	0.58	0.21	0.02	0.92
Degree of Universalism	276	0.87	0.09	0.63	1.05
Trade Openess	360	66.39	32.79	21.46	187.36
Voter Turnout	360	77.60	11.77	42.20	94.80
Left Party in Power	360	0.39	0.49	0	1
Electoral Fractionalization	360	4.51	1.76	2.28	10.29
Population Size	360	9.60	1.02	8.13	11.32
Population over 65	360	14.73	1.83	10.45	19.33
Ethnic Polarization	360	0.324	0.25	0.020	0.87
Post-Cold War Era Dummy	360	0.500	0.50	0	1

Table 2.1: Summary Statistics

estimations to account for serial correlation and the possibility of omitted variables. At the same time, this variable captures the reinforcement effect of past terrorism on present one (e.g., Enders and Sandler, 1999). We take into account time and trending effects by including time dummies. Note that we only use time dummies when this is suggested by joint significance tests. The inclusion of a dummy variable for the end of the Cold War era also controls for the time dependence and trending effects specifically associated with the structural changes in the international system and their effect on terrorism and social systems. We also report some multicollinearity diagnostics. Note that count-data models due to their inherent non-linearity and heteroskedasticity do not produce easily interpretable goodness-of-fit measures such as the R^2 (Verbeek, 2008; Greene, 2012). There is no consensus regarding the usefulness of alternative goodness-of-fit measures for count-data models, as they all seem to suffer from specific drawbacks and are not easy to interpret (Winkelmann and Zimmermann, 1995). Note that because of this we do not report goodness-of-fit measures in this chapter. However, a series of Wald test for all model specifications of this chapter (not reported), which test whether all regression coefficients in the model are simultaneous equal to zero, suggests that our models exhibit some explanatory power, as these tests always turn out to be highly significant.

2.4 Empirical Results

2.4.1 Main Findings

Social Spending and Terrorism

First, we investigate how the frequency of terrorism is affected by total social spending and by spending on health, unemployment and active labor market programs. The results are reported in Table 2.2. Net of the impact of the control variables on the number of terrorist attacks in a given year and country, we find that higher social spending is consistently associated with a lower level of terrorist activity. This results holds for purely domestic terrorism as well as for the more comprehensive measure of total home-grown terrorism.

In particular spending on health and active labor markets may influence terrorism through several of the aforementioned channels. For instance, spending on health may promote economic growth by positively affecting human capital, may reduce poverty by means of redistribution (Brady, 2005) and affect overall satisfaction with life. Similarly, active labor market programs may not only promote economic growth but may also influence satisfaction with life. Furthermore, if we think of the "typical" terrorist as young and with only poor economic perspectives (Ehrlich and Liu, 2002), it is intuitive to find that spending which opens up new perspectives (spending on health and active labor market programs) is particularly effective.

Next, we consider the effects of OLDAGE, FAMILY and HOUSE on the number of terrorist attacks. As shown in Table 2.3, there is considerably less evidence to link public spending on the elderly, the family and housing to the frequency of terrorist attacks. While the spending variables always enter with the expected sign, only FAMILY comes out significant in the specification where the total number of attacks is the dependent variable. These results imply that not all kinds of spending lead to a reduction in terrorist activity.

If we again think of the "typical" terrorist as a young, unmarried male with little economic perspective, our findings are highly intuitive. While, e.g., spending on labor market programs is likely to affect a "typical" would-be terrorist in ways that make terrorism less attractive (by offering non-violent opportunities), the same cannot be anticipated for public spending on the elderly or on public housing. As argued by Brady (2005), public health expenditure is probably the most encompassing measure of welfare-induced redistribution because it is not restricted to specific interest groups (e.g., the elderly or families). Again, it is intuitive to assume that when health expenditures increase (meaning that overall resource redistribution increases) terrorism that is rooted in inequality grievances becomes less likely. Note also that the insignificant effects OLDAGE, FAMILY and HOUSE on the number of terrorist attacks also explain why the coefficient of SOCEXP (total social spending) is substantially smaller than that of the other social spending variables reported in Table 2.2.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SOCEXP	-0.082				-0.097			
	(2.75)***				(3.51)***			
HEALTH		-0.719				-0.672		
		(6.07)***				(6.05)***		
UNEMP			-0.215				-0.234	
			(2.39)**				(2.85)***	
LABOR				-0.655				-0.742
				(2.64)***				(3.19)***
Dependent	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.006
Variable	(3.21)***	(3.14)***	(2.81)***	(2.99)***	(4.11)***	(4.07)***	(3.73)***	(4.19)***
Trade	-0.024	-0.018	-0.026	-0.020	-0.021	-0.016	-0.023	-0.015
Openness	(3.15)***	(3.38)***	(3.36)***	(2.17)**	(2.99)***	(3.32)***	(3.15)***	(1.73)*
Voter Turnout	0.002	0.003	-0.008	-0.027	0.004	0.004	-0.007	-0.030
	(0.17)	(0.28)	(0.61)	(1.93)*	(0.37)	(0.46)	(0.64)	(2.26)**
Left Party	-0.051	0.004	-0.072	-0.071	0.014	0.059	-0.013	-0.036
Power	(0.41)	(0.04)	(0.57)	(0.51)	(0.13)	(0.56)	(0.11)	(0.27)
Electoral	-0.078	-0.133	-0.081	-0.064	-0.085	-0.146	-0.086	-0.065
Fractionalization	(1.06)	(1.96)**	(1.07)	(0.68)	(1.23)	(2.28)**	(1.20)	(0.73)
Population Size	0.631	1.070	0.452	0.291	0.737	1.133	0.556	0.385
	(3.27)***	(4.86)***	(2.22)**	(1.19)	(4.06)***	(5.71)***	(2.82)***	(1.69)*
Population	-0.036	-0.004	-0.081	0.094	-0.022	-0.013	-0.078	0.067
Over 65	(0.54)	(0.07)	(1.18)	(1.26)	(0.39)	(0.27)	(1.25)	(0.93)
Ethnic	2.124	2.027	2.528	1.543	1.942	1.920	2.276	1.182
Polarization	(3.49)***	(3.46)***	(3.73)***	(1.93)*	(3.41)***	(3.41)***	(3.55)***	(1.51)
Post-Cold War	-0.813	-0.539	-0.414	-0.622	-0.828	-0.589	-0.459	-0.589
	(2.54)**	(1.86)*	(1.21)	(1.83)*	(2.78)***	(2.13)**	(1.44)	(1.79)*
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean VIF	2.00	2.00	1.88	1.84	2.02	2.02	1.90	1.86
N*T	331	331	328	295	331	331	328	295

Notes: Dependent variable is the *number of purely domestic terrorist attacks* in models 1-4 and the *total number of domestic terrorist attacks* in models 5-8. Numbers in parentheses are absolute z-values. *, ** and *** denote significance at 10 percent, 5 percent and 1 percent levels, respectively. All explanatory variables lagged by one year (i.e, $t-1$). *Mean VIF* refers to the variance inflation factor, denoting multicollinearity when the mean VIF is larger than 5.

Table 2.2: Welfare Spending Variables and Terrorist Attacks

	(1)	(2)	(3)	(4)	(5)	(6)
OLDAGE	-0.051			-0.056		
	(0.71)			(0.81)		
FAMILY		-0.144			-0.255	
		(1.06)			(1.96)**	
HOUSE			0.053			0.099
			(0.25)			(0.49)
Dependent	0.004	0.005	0.005	0.006	0.006	0.006
Variable	(3.18)***	(3.38)***	(3.24)***	(4.05)***	(4.42)***	(4.15)***
Trade	-0.029	-0.027	-0.030	-0.027	-0.024	-0.023
Openness	(3.90)***	(3.56)***	(3.17)***	(3.82)***	(3.35)***	(2.58)**
Voter Turnout	0.003	0.002	-0.001	0.002	0.002	0.001
	(0.25)	(0.15)	(0.11)	(0.18)	(0.19)	(0.07)
Left Party	-0.090	-0.078	-0.099	-0.031	-0.009	-0.036
Power	(0.70)	(0.61)	(0.77)	(0.26)	(0.08)	(0.30)
Electoral	-0.099	-0.107	-0.132	-0.101	-0.116	-0.091
Fractionalization	(1.31)	(1.44)	(1.43)	(1.41)	(1.67)*	(1.07)
Population Size	0.539	0.504	0.498	0.597	0.569	0.503
	(2.61)***	(2.65)***	(2.41)**	(3.01)***	(3.22)***	(2.46)**
Population	-0.074	-0.085	-0.093	-0.061	-0.063	-0.072
Over 65	(1.01)	(1.35)	(1.40)	(0.92)	(1.11)	(1.17)
Ethnic	2.105	2.254	2.091	1.948	2.116	2.343
Polarization	(3.33)***	(3.65)***	(2.53)**	(3.26)***	(3.61)***	(2.88)***
Post-Cold War	-0.827	-0.909	-0.374	-0.878	-0.977	-0.575
	(2.43)**	(2.68)***	(0.69)	(2.76)***	(3.12)***	(1.16)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Mean VIF	2.14	1.94	1.79	2.16	1.96	1.81
N*T	331	331	308	331	331	308

Notes: Dependent variable is the *number of purely domestic terrorist attacks* in models 1-3 and the *total number of domestic terrorist attacks* in models 4-6. Numbers in parentheses are absolute z-values. *, ** and *** denote significance at 10 percent, 5 percent and 1 percent levels, respectively. All explanatory variables lagged by one year (i.e, $t-1$). *Mean VIF* refers to the variance inflation factor, denoting multicollinearity when the mean VIF is than 5.

Table 2.3: Additional Welfare Spending Variables and Terrorist Attacks

We also estimate how social spending is related to the ferocity of purely domestic and total homeland terrorism. We report our findings on the effect of SOCEXP, HEALTH, UNEMP and LABOR on terrorist violence in Table 2.4. Our results are broadly consistent with previous ones. There are negative and significant effects of SOCEXP, HEALTH and LABOR on the dependent variable. However, the impact of UNEMP on terrorist violence is negative but not significant. We can interpret the major terror-dampening effects of HEALTH and LABOR on terrorist violence as before, arguing that higher spending in these fields (intuitively) affects the terrorists' calculi more strongly. In general, these findings suggest moderate effects of social spending on a reduction of homeland terrorism.

We also investigate how spending on old age, the family and public housing relates to terrorist violence. The results are given in Table 2.5. For terrorist violence, OLDAGE and FAMILY are found to reduce terrorist violence significantly. The effect of public housing spending on terrorist violence remains insignificant. For instance, these results imply that higher spending on the family may lead to less social dissatisfaction and may be seen as a credible effort to reduce poverty and inequality, thereby draining terrorist violence that is rooted in these very factors. No evidence is found for a substantial link from public housing spending to homeland terrorism.

Finally, we examine the results for the control variables. Considering the frequency of terrorism, we find that past terrorist activity is positively associated with present terrorism, hinting at the self-energizing nature of terrorism detected in many other studies. Terrorism is also positively linked to larger populations, but this may simply indicate that terrorism (measured in absolute numbers) is more likely in more populous countries. Higher ethnic polarization is also associated with higher terrorist activity, indicating that ethnic conflicts translate into an increased likelihood of terrorism. By contrast, higher trade openness is found to be negatively linked to terrorist attacks in statistically significant ways. This is in line with Blomberg and Hess (2008a). Economic integration may spur economic development, which in turn reduces incentives for terrorism. There is also a negative effect of the post-Cold War dummy, indicating that terrorism became less likely

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SOCEXP	-0.120				-0.115			
	(2.85)***				(3.93)***			
HEALTH		-0.705				-0.610		
		(5.48)***				(5.08)***		
UNEMP			-0.001				-0.062	
			(0.01)				(0.59)	
LABOR				-0.649				-0.684
				(2.60)***				(2.41)**
Dependent	0.003	0.003	-0.649	0.003	0.003	0.003	0.003	0.003
Variable	(3.03)***	(4.35)***	(2.60)***	(4.66)***	(4.26)***	(3.67)***	(3.94)***	(3.38)***
Trade	-0.046	-0.028	-0.036	-0.043	-0.036	-0.034	-0.040	-0.062
Openness	(3.67)***	(2.95)***	(3.99)***	(3.36)***	(3.81)***	(3.55)***	(4.31)***	(3.70)***
Voter Turnout	0.014	0.012	0.011	0.004	0.013	0.007	0.006	-0.005
	(0.70)	(1.03)	(0.89)	(0.27)	(1.17)	(0.60)	(0.53)	(0.37)
Left Party	-0.234	-0.043	-0.061	0.027	0.033	-0.021	-0.050	-0.223
Power	(1.22)	(0.28)	(0.36)	(0.16)	(0.21)	(0.14)	(0.29)	(1.12)
Electoral	-0.153	-0.332	-0.305	-0.476	-0.269	-0.345	-0.323	-0.515
Fractionalization	(1.46)	(4.05)***	(3.01)***	(4.40)***	(3.21)***	(4.29)***	(3.15)***	(4.91)***
Population Size	0.224	1.160	0.597	0.819	0.744	1.034	0.569	0.706
	(0.85)	(6.31)***	(4.44)***	(5.74)***	(5.55)***	(6.16)***	(4.46)***	(4.58)***
Population	0.026	0.138	-0.043	0.199	0.142	0.158	-0.013	0.200
Over 65	(0.26)	(2.13)**	(0.61)	(2.46)**	(2.15)**	(2.44)**	(0.17)	(2.29)**
Ethnic	3.601	2.470	3.208	2.937	2.804	2.264	3.131	2.814
Polarization	(4.97)***	(4.99)***	(5.47)***	(5.35)***	(6.13)***	(4.72)***	(5.64)***	(5.32)***
Post-Cold War	-0.512	-0.121	-0.100	-0.480	-0.114	-0.094	-0.031	-0.172
	(1.17)	(0.60)	(0.44)	(2.18)**	(0.57)	(0.47)	(0.14)	(0.35)
Time Dummies	Yes	No	No	No	No	No	No	No
Mean VIF	1.97	1.97	1.85	1.81	1.98	1.97	1.85	1.82
N*T	331	331	328	295	331	331	328	295

Notes: Dependent variable is the *number of victims from purely domestic terrorism* in models 1-4 and the *total number of victims from domestic terrorism* in models 5-8. Numbers in parentheses are absolute z-values. ** and *** denote significance at 5 percent and 1 percent levels, respectively. All explanatory variables lagged by one year (i.e, $t-1$). *Mean VIF* refers to the variance inflation factor, denoting multicollinearity when the mean VIF is larger than 5.

Table 2.4: Welfare Spending Variables and Terrorism Victims

	(1)	(2)	(3)	(4)	(5)	(6)
OLDAGE	-0.188			-0.176		
	(3.00)***			(3.01)***		
FAMILY		-0.406			-0.357	
		(3.16)***			(2.95)***	
HOUSE			-0.301			0.156
			(0.95)			(0.88)
Dependent	0.003	0.004	0.005	0.003	0.003	0.003
Variable	(3.51)***	(4.67)***	(4.43)***	(3.23)***	(4.14)***	(4.06)***
Trade	-0.040	-0.029	-0.078	-0.058	-0.035	-0.053
Openness	(4.41)***	(3.18)***	(4.89)***	(4.94)***	(3.84)***	(4.67)***
Voter Turnout	0.016	0.009	0.010	0.018	0.005	-0.012
	(1.42)	(0.80)	(0.69)	(1.44)	(0.43)	(0.94)
Left Party	-0.022	-0.013	-0.393	-0.287	0.007	-0.133
Power	(0.14)	(0.08)	(2.20)**	(1.63)	(0.04)	(0.86)
Electoral	-0.246	-0.303	-0.422	-0.0303	-0.305	-0.453
Fractionalization	(2.56)**	(3.20)***	(3.78)***	(3.22)***	(3.24)***	(4.49)***
Population Size	0.737	0.646	0.334	0.590	0.586	0.566
	(5.62)***	(4.33)***	(1.92)*	(4.34)***	(4.24)***	(4.78)***
Population	0.075	0.046	-0.079	0.059	0.069	0.067
Over 65	(1.25)	(0.65)	(0.88)	(0.89)	(0.67)	(0.93)
Ethnic	2.728	2.924	3.053	2.525	2.802	2.529
Polarization	(5.48)***	(5.27)***	(4.41)***	(5.20)***	(5.25)***	(5.11)***
Post-Cold War	-0.011	-0.283	-1.510	-0.274	-0.209	-0.059
	(0.05)	(1.26)	(2.13)**	(0.65)	(0.95)	(0.28)
Time Dummies	No	No	Yes	Yes	No	No
Mean VIF	2.13	1.91	1.77	2.11	1.92	1.77
N*T	331	331	308	331	331	308

Notes: Dependent variable is *the number of purely domestic terrorist attacks* in models 1-3 and the *total number of domestic terrorist attacks* in models 4-6. Numbers in parentheses are absolute z-values. *, ** and *** denote significance at 10 percent, 5 percent and 1 percent levels, respectively. All explanatory variables lagged by one year (i.e, $t-1$). *Mean VIF* refers to the variance inflation factor, denoting multicollinearity when the mean VIF is larger than 5.

Table 2.5: Additional Welfare Spending Variables and Terrorism Victims

after the end of the Cold War, e.g., as left-wing terrorist groups lost part of their ideological and financial base with the fall of Communism. In contrast to the former findings, there is little evidence of the importance of political variables (left-wing government, voter turnout, fractionalization of the electorate) in explaining the frequency of terrorism. The results of the controls for terrorism ferocity are in many ways similar to the previous ones. There is a positive association between past and present terrorist violence and a positive effect of population size and ethnic polarization on terrorism. Higher levels of trade openness are linked to lower levels of terrorist violence. However, there is no strong relationship between the end of the Cold War and terrorist violence. In addition, political competition (electoral fractionalization) is now found to be negatively related to terrorist violence. In some specifications, an older population is also found to be positively linked to terrorism.

The Worlds of Welfare Capitalism and Terrorism

We have already stressed that social spending variables d not necessarily provide a complete picture of a potential nexus between social policies and terrorist activity. Therefore, we assess the impact of welfare regime variables on terrorist activity in Western Europe. First, we analyze whether higher levels of decommodification and more egalitarian forms of social stratification influence the number of terrorist attacks, as suggested in our second hypothesis. The results are reported in Table 2.6. The findings indicate that only UNEM RPL (unemployment replacement rate) significantly reduces the number of terrorist attacks. The broader decommodification measure (DEMSCORE) is found to significantly lower only the likelihood of the total number of homeland terrorist attacks. UNIV, which indicates the degree of universalism (i.e., of social stratification) in a society, is never found to significantly sway the number of attacks, even though the sign of the coefficient is as anticipated. Overall, these findings provide some support for the idea that higher levels of decommodification reduce the number of home-grown terrorist attacks. This relationship seems to be particularly important with respect to unemployment benefit generosity but not so important for welfare state generosity in general (DEMSCORE). While the former

should matter to the "typical" terrorist and their supporters, the latter is also related to generosity towards the elderly and the sick, so less connected to an environment potentially bearing terrorism. This finding also matches our previous insights into the relative importance of social spending on unemployment and labor market programs.

Next, we want to assess to which extent welfare regime variables interact with terrorist violence. The findings are given in Table 2.7. These results show that UNEM RPL and DEMSCORE significantly reduce terrorist violence from purely domestic and total terrorist activity. Thus, our findings again stress the role of higher welfare state generosity (i.e., of higher decommodification) in reducing terrorists' incentives to act violently. Lower levels of market dependence may cause lower levels of income inequality and social dissatisfaction, thereby making terrorism rooted in these very conditions less likely. Contrary to the findings in Table 2.6, we now even find a weakly significant negative effect of higher universalism on terrorist violence, at least for purely domestic terrorism. While this result indicates that welfare regimes fostering social equality are less prone to terrorist violence (as social inequality may otherwise contribute to terrorism), the results from Tables 2.6 and 2.7 generally seem to show that higher levels of decommodification matter more to terrorism than the promotion of social equality. The social-democratic world of welfare capitalism, which offers the highest degree of market independence, may be regarded as least vulnerable to homeland terrorism. Welfare regimes offering lower levels of market independence (i.e., the liberal regime) may be seen as more prone to such forms of terrorism.

The results for the controls are generally as expected. While past terrorism and bigger populations make terrorist attacks and related violence more likely, a higher level of trade openness makes terrorism less probable. Terrorist attacks are also less likely in the post-Cold War era, which is consistent with previous results. Interestingly, while political factors continue not to matter to terrorist violence, higher voter turnout and a left-wing government are found to reduce the number of home-grown terrorist attacks against domestic and international targets alike. These findings provide at least some support for the idea that democratic participation and government ideology are important determinants of

	(1)	(2)	(3)	(4)	(5)	(6)
DEMSCORE	-0.155			-0.191		
	(1.39)			(1.77)*		
UNEM RPL		-3.758			-3.280	
		(4.69)***			(3.23)***	
UNIV			-0.621			-2.263
			(0.30)			(1.21)
Dependent	0.004	0.003	0.003	0.006	0.004	0.005
Variable	(2.16)**	(1.99)**	(1.76)*	(3.02)***	(2.37)**	(2.64)***
Trade	0.004	-0.008	-0.003	0.009	0.002	0.003
Openness	(0.34)	(0.69)	(0.24)	(0.84)	(0.20)	(0.35)
Voter Turnout	-0.038	-0.079	-0.033	-0.042	-0.064	-0.041
	(2.34)**	(4.20)***	(2.01)**	(2.90)***	(3.26)***	(2.74)***
Left Party	-0.493	-0.639	-0.503	-0.403	-0.496	-0.396
Power	(2.55)**	(3.34)***	(2.56)**	(2.28)**	(2.76)***	(2.23)**
Electoral	-0.094	-0.123	-0.056	-0.066	-0.068	-0.033
Fractionalization	(0.85)	(1.20)	(0.53)	(0.57)	(0.65)	(0.32)
Population Size	1.209	0.731	1.284	1.296	1.095	1.373
	(4.76)***	(2.49)**	(5.51)***	(5.78)***	(3.84)***	(6.65)***
Population	-0.024	0.223	-0.086	-0.024	0.157	-0.076
Over 65	(0.20)	(1.85)*	(0.76)	(0.21)	(1.21)	(0.72)
Ethnic	1.162	2.620	0.926	0.672	0.890	0.447
Polarization	(1.16)	(1.96)**	(0.93)	(0.65)	(0.76)	(0.45)
Post-Cold War	-1.309	-3.990	-1.247	-1.370	-3.037	-1.278
	(3.80)***	(4.65)***	(3.36)***	(4.53)***	(4.53)***	(3.66)***
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Mean VIF	2.33	2.18	2.27	2.34	2.19	2.28
N*T	276	269	276	276	269	276

Notes: Dependent variable is the *number of purely domestic terrorist attacks* in models 1-3 and the *total number of domestic terrorist attacks* in models 4-6. Numbers in parentheses are absolute z-values. *, ** and *** denote significance at 10 percent, 5 percent and 1 percent levels, respectively. All explanatory variables lagged by one year (i.e, $t-1$). *Mean VIF* refers to the variance inflation factor, denoting multicollinearity when the mean VIF is larger than 5.

Table 2.6: Welfare Regime Variables and Terrorist Attacks

	(1)	(2)	(3)	(4)	(5)	(6)
DEMSCORE	-0.234			-0.192		
	(2.66)***			(2.19)**		
UNEM RPL		-1.429			-1.157	
		(2.85)***			(2.35)**	
UNIV			-4.851			-3.393
			(1.93)*			(1.41)
Dependent	0.003	0.003	0.003	0.003	0.002	0.003
Variable	(3.44)***	(2.56)**	(3.20)***	(2.92)***	(2.20)**	(2.76)***
Trade	-0.016	-0.037	-0.024	-0.020	-0.038	-0.028
Openness	(1.10)	(2.44)**	(1.67)*	(1.39)	(2.60)***	(2.03)**
Voter Turnout	0.006	0.015	0.007	0.004	0.012	0.006
	(0.34)	(0.86)	(0.41)	(0.23)	(0.71)	(0.41)
Left Party	-0.331	-0.278	-0.242	-0.302	-0.258	-0.235
Power	(1.28)	(1.06)	(0.95)	(1.18)	(0.99)	(0.94)
Electoral	-0.148	0.015	-0.160	-0.127	0.007	-0.128
Fractionalization	(1.26)	(0.12)	(1.29)	(1.14)	(0.06)	(1.08)
Population Size	1.418	1.445	1.466	1.387	1.413	1.422
	(4.57)***	(4.45)***	(4.72)***	(4.85)***	(4.76)***	(5.03)***
Population	-0.036	-0.024	-0.059	-0.024	-0.016	-0.042
Over 65	(0.29)	(0.19)	(0.47)	(0.20)	(0.13)	(0.35)
Ethnic	5.457	5.726	6.093	5.222	5.479	5.720
Polarization	(4.97)***	(4.71)***	(5.19)***	(5.00)***	(4.70)***	(5.25)***
Post-Cold War	-0.569	-0.398	-0.385	-0.522	0.385	-0.359
	(1.79)*	(1.32)	(1.26)	(1.63)	(1.26)	(1.17)
Time Dummies	No	No	No	No	No	No
Mean VIF	2.32	2.19	2.27	2.33	2.19	2.28
N*T	276	269	276	276	269	276

Notes: Dependent variable is the *number of victims from purely domestic terrorism* in models 1-3 and the *total number of victims from domestic terrorism* in models 4-6. Numbers in parentheses are absolute z-values. *, ** and *** denote significance at 10 percent, 5 percent and 1 percent levels, respectively. All explanatory variables lagged by one year (i.e, $t-1$). *Mean VIF* refers to the variance inflation factor, denoting multicollinearity when the mean VIF is larger than 5.

Table 2.7: Welfare Regime Variables and Terrorism Victims

terrorist activity, as previously found by Li (2005), Burgoon (2006) and Koch and Cranmer (2007).

2.4.2 Robustness

We also perform some additional robustness checks to see whether our results are stable to methodological changes. First, we run our standard model without the inclusion of a lagged dependent variable and time dummies. Second, we run the standard empirical specification with a reduced dataset. That is, we exclude several Scandinavian countries from the dataset that exhibit very little terrorist activity but have very developed (social-democratic) welfare systems (e.g., Norway or Denmark). In general, our robustness findings confirm that social spending and welfare regime variables are negatively and significantly associated with terrorist activity. This relationship is stronger for the spending variables, giving further support to our hypothesis H_1. We also find moderate support for our second hypothesis H_2. Our previously reported results are thus stable to a number of methodological changes and do not seem to be randomly generated.

2.4.3 Extension

As an extension to our empirical work we consider the case of transnational terrorism. This extension may also be seen as another form of robustness check. Crenshaw et al. (2007) note that any effect of social policies on terrorism should be stronger in the countries generating terrorism (i.e., in the terrorists' homeland) compared to the target or location country of transnational terrorism. We similarly argue that transnational terrorism that has its origins outside Western Europe should be far less responsive to benevolent social policies due to the lack of connection to the welfare systems it targets. For instance, it is not intuitive to assume that the terrorist attacks by the *Groupe Islamique Armé* (*GIA*, an Algerian organization) in France in the 1990s were somehow influenced by French social policies. Rather, we assume that GIA actions were driven by factors associated with socio-economic and political developments in Algeria. We thus assume that transnational

terrorism imported into Western Europe is not affected by social policies in the country where the attacks take place. Such attacks in one country may be better understood as spillover of domestic conflict in another country (Addison and Murshed, 2005) or as a violent response to the foreign policy of the country targeted by transnational terrorism (Savun and Phillips, 2009). More generally, and as noted in the introduction to this thesis, transnational terrorism is more likely to be linked to the global politico-economic and military order than to domestic socio-economic conditions.

In order to assess whether terrorist attacks imported into Western Europe follow a different pattern than attacks by groups operating in their homeland, we modify our empirical model accordingly. As dependent variables, we use the number of terrorist attacks by *known terrorist groups which have a homeland outside of Western Europe*.[18] We also use the number of victims from those attacks as another dependent variable. We employ the usual indicators for social spending and welfare regimes as independent variables. As control variables, we use the previously discussed variables because they have also been employed as factors explaining transnational attacks before (e.g., Li and Schaub, 2004; Piazza, 2006; Burgoon, 2006).[19]

Our empirical results are given in Table 2.8. While we only present assorted results here, the findings for other specifications are very similar.[20] They suggest that there is no significant effect of spending or welfare regime variables on the number of imported transnational terrorist attacks and on the number of victims from these attacks. This suggests that terrorism imported into Western Europe is not swayed by social policies of the country where the attack eventually takes place. This is in line with Crenshaw et al. (2007). Interestingly, these kinds of attacks are more likely when countries are more open, which

[18] Such terrorist organizations (with their respective homeland) include the *Kurdistan Worker's Party PKK* (Turkey), the *Popular Front for the Liberation of Palestine PFLP* (Israel/Palestine), the *Japanese Red Army JRA* (Japan) and the *Armenian Secret Army for the Liberation of Armenia ASALA* (USSR/Turkey/Armenia).

[19] We only exclude *population over 65* from the set of controls because there is no theoretical or empirical contribution linking this factor to transnational attack patterns.

[20] In fact, we only find a negative effect of OLDAGE on terrorism victims that is significant at the 10% level. For all other social spending or welfare regime variables there is no significant effect on transnational terrorist attacks or victims.

is exactly the opposite compared to the case of homeland terrorism. Blomberg and Hess (2008a) find similar results. Furthermore, ethnic factors do not matter to transnational terrorism, while population size and the post-Cold War era still do. Political factors emerge as insignificant. As we can see from Table 2.8, transnational terrorist attacks are obviously influenced by factors omitted by our standard model (e.g., by foreign policy). Overall, our empirical extension matches our central hypotheses and previously presented results. Social spending and the welfare regime matter to homeland terrorism where their influence on the terrorists' and supporters' calculi is comprehensive, but not to imported terrorism.

2.5 Conclusion

In this contribution we investigated whether social spending and welfare regime variables have an impact on terrorist activity originating in 15 Western European countries during 1980-2003. We argued that welfare spending alters socio-economic conditions in ways that reduce home-grown terrorist activity (i.e., by increasing the opportunity costs of terrorism through socio-economic improvements). We also argued that certain worlds of welfare capitalism differ with respect to the degree of market dependence and social stratification they offer and propagate, thereby influencing the terrorists' calculi in different ways. Our central hypotheses were that higher social spending reduces homeland terrorism and that more social-democratic worlds of welfare capitalism are less prone to terrorism.

We find that social spending in certain fields (health, unemployment benefits, active labor market programs) indeed significantly reduces homeland terrorist activity. While total social spending also negatively correlates with terrorist activity, higher social spending in other fields (e.g., public housing) does not universally translate into less terrorism. Further evidence also suggests that more generous welfare systems offering high degrees of decommodification are less prone to terrorism. Independent of the actual level of social spending, our findings provide moderate support for the hypothesis that more social-democratic worlds of welfare capitalism are less prone to terrorist activity originating from within their borders. In general, we find ample evidence linking welfare policies to terrorism. There

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SOCEXP	-0.023				-0.041			
	(0.81)				(1.15)			
HEALTH		-0.018				0.200		
		(0.17)				(1.48)		
LABOR			-0.126				0.073	
			(0.50)				(0.20)	
DEMSCORE				-0.092				-0.059
				(1.50)				(0.64)
Dependent	0.058	0.058	0.055	0.053	0.004	0.004	0.005	0.003
Variable	(5.54)***	(4.55)***	(3.58)***	(3.94)***	(1.93)*	(2.22)**	(2.42)**	(1.43)
Trade	0.014	0.014	0.020	0.022	0.009	0.008	0.011	0.013
Openness	(2.38)**	(2.41)**	(2.95)***	(3.63)***	(1.42)	(1.17)	(1.53)	(1.84)*
Voter Turnout	-0.013	-0.090	-0.019	-0.027	0.020	0.010	0.006	0.008
	(1.06)	(1.65)*	(1.58)	(2.67)***	(1.38)	(0.68)	(0.40)	(0.56)
Left Party	0.015	-0.022	0.183	0.067	-0.431	-0.533	-0.264	-0.448
Power	(0.08)	(0.12)	(0.81)	(0.33)	(1.57)	(1.98)**	(0.87)	(1.52)
Electoral	0.058	0.044	0.032	0.015	-0.058	-0.109	-0.012	-0.135
Fractionalization	(0.73)	(0.56)	(0.37)	(0.20)	(0.57)	(1.06)	(0.11)	(1.35)
Population Size	0.539	0.527	0.635	0.609	0.303	0.145	0.471	0.271
	(3.47)***	(3.37)***	(3.39)***	(4.22)***	(1.76)*	(0.78)	(2.47)**	(1.43)
Ethnic	-0.612	-0.638	-0.553	-0.649	-0.602	-0.506	-1.062	-0.540
Polarization	(1.03)	(1.08)	(0.81)	(1.06)	(0.97)	(0.79)	(1.44)	(0.69)
Post-Cold War	-0.541	-0.623	-0.964	-1.245	-1.589	-1.723	-1.666	-1.502
	(1.14)	(1.30)	(1.79)*	(3.09)***	(4.64)***	(5.09)***	(4.66)***	(4.11)***
Time Dummies	Yes	Yes	-0.964	Yes	No	No	No	No
Mean VIF	1.66	1.59	1.50	1.74	1.64	1.57	1.48	1.73
N*T	331	331	295	276	331	331	295	276

Notes: Dependent variable is the *number of purely transnational terrorist attacks* in models 1-4 and the *total number of victims from purely transnational terrorism* in models 5-8. Numbers in parentheses are absolute z-values. ** and *** denote significance at 5 percent and 1 percent levels, respectively. All explanatory variables lagged by one year (i.e, $t-1$). *Mean VIF* refers to the variance inflation factor, denoting multicollinearity when the mean VIF is larger than 5.

Table 2.8: Assorted Welfare Spending and Regime Variables and Transnational Terrorism

are moderate effects of welfare policies—indicated by social spending and welfare regime variables—on terrorist activity, presumably as welfare policies influence a variety of socio-economic factors (e.g., economic growth, employment, poverty, economic security) in which terrorism may be rooted. Our findings are robust to different specifications.

Welfare policies may thus be seen as helpful instruments for fighting terrorism. This applies in particular to social policies (e.g., unemployment compensation or labor market mobilization) that are connected to the socio-economic environment of "typical" terrorists and their supporters. It applies somewhat less to social policies (e.g., on public housing) that target conditions outside this very environment, and applies neither to transnational terrorist activity that is imported into Western Europe. Overall, our findings imply that social policies in fields that improve the socio-economic conditions of terrorists and their support are effective in reducing terrorist activity, which is consistent with rational-choice theory. This result holds even when we acknowledge that terrorism is also driven by other factors, be they ethnic conflict, political developments or past histories of repression and dictatorship (cf. Sanchez-Cuenca, 2009). In an economic sense social spending and welfare regime variables affect terrorist activity by influencing certain intervening variables, thereby impacting the opportunity costs of violence (i.e., making terrorism comparatively more costly). Our analysis thus sides with other contributions that emphasize the importance of raising the opportunity costs to terrorists instead of relying on hard-line counter-terrorism strategies (e.g., Frey and Luechinger, 2003). In the light of our results welfare state retrenchments (e.g., to reduce fiscal deficits) should be considered with caution because they may make home-grown terrorism more likely. Potentially, there is a trade-off between the positive and negative effects of welfare state reform, where the latter may become manifest in less internal security.

With this contribution we add to the discussion on a potential terrorism-welfare policy nexus started by Burgoon (2006) and Crenshaw et al. (2007). We extend the approach by Burgoon (2006), e.g., by looking at specific kinds of social spending, at welfare regime variables and at homeland terrorist activity. While our evidence suggests that there is a

strong and negative interdependency between welfare policies and terrorism in Western Europe, some questions remain open. As previously discussed, Western Europe suffered from waves of mainly home-grown left-wing and ethnic-nationalist terrorism in the past. Welfare policies do not necessarily discourage the new waves of internationalized or religious terrorism which Western Europe could face in future. Religiously motivated terrorists are driven by the belief in the superiority of their world view. The possibility of changing their minds by means of welfare policies seems limited, which suggests that the effect of social welfare policies on terrorism is heterogeneous and governed by terrorism-specific factors.[21] Future research may thus focus on the effectiveness of social policies on terrorism affiliated with certain ideologies. At the same time, the interaction between social policies and terrorism should be investigated for other parts of the world. It is currently unclear whether they may similarly benefit from a potential terrorism-welfare policy nexus. On the one hand, other parts of the world may not exhibit such mature welfare regimes as Western Europe. On the other hand, other causes of terrorist activity (e.g., political instability and repression) may matter more strongly, so the effect of social policies on terrorism may not be that prominent. Finally, it may also be interesting to examine whether social policies also diminish other forms of undesired behavior in societies (e.g., violent crime). While we provide evidence that social policies contribute to a reduction of terrorist activity by improving the socio-economic conditions in which terrorism is (partly) rooted, similar effects on other social phenomena through similar channels may also be possible and should be assessed.

[21] In fact, Crenshaw et al. (2007) provide first evidence that international terrorism driven by religious world views is unlikely to be affected by welfare means.

Appendix A to Chapter 2. Independent Variables

Total Social Public Expenditure — *Description*: Broad expenditure measure on publicly financed health and social protection, e.g., on unemployment, sickness etc. *Notes*: For missing values, see OECD (2007). *Source*: OECD (2007). *Unit*: Expenditure to GDP.

Public Health Expenditure — *Description*: Measures public spending on in- and out-patient care, medical goods etc. *Notes*: For missing values, see OECD (2007). *Source*: OECD (2007). *Unit*: Expenditure to GDP.

Unemployment Benefits — *Description*: Indicates cash expenditure on unemployment compensation etc. *Notes*: For missing values, see OECD (2007). *Source*: OECD (2007). *Unit*: Expenditure to GDP.

Active Labor Market Programs — *Description*: Measures public spending on employment services, youth training etc. *Notes*: For missing values, see OECD (2007). *Source*: OECD (2007). *Unit*: Expenditure to GDP.

Old Age Spending — *Description*: Indicates spending on pensions, housing services etc. *Notes*: For missing values, see OECD (2007). *Source*: OECD (2007). *Unit*: Expenditure to GDP.

Family Expenditure — *Description*: Proxy for spending on childcare support, single parent support etc. *Notes*: For missing values, see OECD (2007). *Source*: OECD (2007). *Unit*: Expenditure to GDP.

Public Housing — *Description*: Measures public expenditure on housing allowances etc. *Notes*: For missing values, see OECD (2007). *Source*: OECD (2007). *Unit*: Expenditure to GDP.

Decommodification Score — *Description*: Assesses the overall generosity of a welfare state regime with respect to features of public programs for unemployment, sickness and old age insurance, using the methodology by Esping-Andersen (1990). *Notes*: For missing values, see Scruggs (2004). *Source*: Scruggs (2004). *Unit*: Calculated index.

Unemployment Replacement Rate — *Description*: Ratio of net unemployment benefits

to net income of an unmarried single person. *Notes*: For missing values, see Scruggs (2004). *Source*: Scruggs (2004). *Unit*: Rate.

Degree of Universalism — Description: Indicates the degree to which the labor force and old population are covered by unemployment and sickness insurance, and by pensions. *Notes*: For missing values, see Scruggs (2004). *Source*: Raw data from Scruggs (2004). *Unit*: Percentage, own calculations following Scruggs and Allan (2008).

Appendix B to Chapter 2. Control Variables

Trade Openness — *Description*: Sum of exports and imports to real GDP. Indicates the degree of economic integration of a country. *Source*: PENN World Table (Heston et al., 2006). *Unit*: Ratio.

Voter Turnout — *Description*: Voter turnout in national election. Indicates degree of democratic participation. *Source*: Comparative Political Data Set (Armingeon et al., 2008). *Unit*: Percentage.

Left Party — *Description*: Indicates whether a left-wing government is in power. *Source*: Beck et al. (2001). *Unit*: Dummy variable (1 when the left is in power, 0 otherwise).

Electoral Fractionalization — *Description*: Index of electoral fractionalization of the party-system. Proxy for political competition and social cleavages. *Source*: Comparative Political Data Set (Armingeon et al., 2008). *Unit*: Calculated index.

Population Size — *Description*: Total population size. *Source*: World Bank (2006). *Unit*: Logged, in thousands.

Population over 65 — *Description*: Indicator of the number of people aged 65 or older in one country. *Source*: World Bank (2006). *Unit*: Percentage.

Polarization — *Description*: Indicator of the degree of ethnic polarization of a country. *Source*: Montalvo and Reynal-Querol (2005). *Unit*: Constant calculated index.

Post Cold War — *Description*: Indicates the post-Cold War period (1992-2003). *Unit*: Dummy variable.

Chapter 3

Causal Linkages Between Domestic Terrorism and Economic Growth

This chapter is a joint work with Thomas Gries and Tim Krieger. A nearly identical version of it was published in 2011 in Defence and Peace Economics 22(5), 493-508.

3.1 Introduction

As already noted in the introduction to this thesis, the question of causality between terrorism and economic performance has not been settled. Does terrorism lead to noticeable damages to aggregate performance, does poor economic performance contribute to the generation of terror, or do both effects exist side by side? On the one hand, the allocation and accumulation of resources may be negatively influenced by terrorism, e.g., as investment or savings are discouraged, consequently also affecting economic growth. On the other hand, economic factors may play an important role in explaining terrorism, e.g., as low opportunity costs of violence (manifested in poor economic growth) may foster conflict.

This contribution aims to identify the links between the intensity of domestic terrorism and the rate of real GDP per capita growth.[1] We investigate this relationship for seven Western European countries (France, Germany, Greece, Italy, Portugal, Spain and the United Kingdom). All investigated countries experienced substantial economic suc-

[1] As defined in the introduction of this thesis, domestic terrorism is terrorism involving only citizens, groups or the territory of one country. By contrast, transnational terrorism means terrorism involving citizens, groups or the territory of more than one country, where either the sources or targets of transnational terrorism can be analyzed.

cess in the past. Most countries grew between 2 and 4% p.a. between 1950 and 2004. Nevertheless, these countries also suffered episodes of major political violence, especially in comparison to other countries in this part of the world. In fact, the seven selected countries accounted for 97% of all reported terrorist attacks and 96% of all reported terror-related fatalities from 1950 to 2004, according to the *Terrorism in Western Europe: Events Data* (*TWEED*) dataset compiled by Engene (2007).[2] Most domestic terrorist organizations in the investigated countries were driven by leftist, ethnic-nationalist or separatist ideologies (Engene, 2007). Thus, they were potentially motivated by political factors. However, terrorism cannot be sensibly explained by one root cause only. With our analysis, we want to find out whether economic performance (economic growth) also swayed the terrorists' calculus. At the same time, we want to analyze whether terrorism negatively affected growth.

We test for terrorism-growth Granger causality in a time-series framework. We try to detect causality only in a statistical but not purely philosophical ("cause and effect") sense. Our analysis is helpful in approximating philosophical causality without implying it, so corresponding interpretations should be made carefully. Causality between terrorism and growth can take four possible forms: terrorism may cause economic growth, growth may cause terrorist activity, both causal effects may exist side by side, or no causal relationship may be detected. In order to investigate for Granger causality in our empirical framework, we first examine the stationarity properties of the underlying time series through a unit root test. At this point we are also able to identify structural breaks, i.e., major changes in the country's economic or political history during the period of observation. We then process our data in accordance with the unit root test results. When we test for Granger causality, we rely on the Hsiao-Granger procedure to circumvent common problems associated with detecting Granger causality in time-series frameworks. In comparison to standard Granger causality tests our procedure allows for high variations in lag length

[2] In total, the TWEED dataset provides information on domestic terrorism for 18 Western European countries. As noted by Drakos (2011), the definition of terrorism used by the TWEED dataset is quite similar to the definition of terrorism by the GTD.

selection. In order to avoid omitted variable biases and to check for robustness, we test for causality in a bivariate and trivariate system. In the trivariate setting we use trade openness as a control variable. By testing for Granger causality in a time-series setting, we add to existing evidence which has mainly blanked out the question of causality between economic performance and terrorist violence.

As our main results, we find that (1) all the investigated growth and terror series exhibit structural breaks that coincide with important turning points in the countries' economic and political history. (2) In bivariate systems economic growth leads terrorist violence in all cases, whereas terrorism causally influences growth only in the case of Portugal. It appears as if economic performance influences the terrorists' calculus, yet the resiliency of attacked economies is generally high, so terror-induced shocks do not feed through to growth. (3) Knowing that bivariate causality tests are prone to inconsistencies, we also perform causality tests in trivariate systems. The findings confirm that economies under attack are successful in adjusting to the threats of terror, so growth is not impaired. With respect to Granger causality running from growth to terrorism, the results weaken previous ones from the bivariate analysis. Economic performance robustly sways the terrorists' calculus only for Germany, Portugal and Spain, but not for the rest of the sample. That is, in some countries solid growth may raise the opportunity costs of terror, thus discouraging violent behavior, e.g. as individuals find more economic opportunities. The opposite relationship should hold in periods of economic downturn. Policymakers should not underestimate the role of economic factors—and of the opportunity costs of violence—in impacting domestic terrorism. For some countries in Western Europe economic success apparently contributed to a crowding out of domestic terrorism. However, factors other than economic performance (e.g. political transformation or ethnic tensions) should also be considered when explaining terrorism dynamics, in particular when terrorism-growth links are not found to be strong.

The remainder of this contribution is organized as follows. In the next section we discuss the academic literature on possible interactions between terrorism and growth. Afterwards,

we introduce the data and our methodology, and also present our empirical results. Then, we discuss our findings, before summing up our results in the final section.

3.2 Causal Links Between Terrorism and Growth

3.2.1 Potential Impact of Terrorism on Economic Growth

A central short-run goal of terrorists is economic destabilization. Terrorist actions (e.g., assassinations or bombings) are means to achieve this short-run goal. Long-run political objectives (such as a redistribution of wealth and power) are to be enforced through such actions. Collier (1999) identifies several channels through which civil war affects the economy; Collier's ideas may be transferred to terrorism as another form of violent conflict. The channels of transaction from conflict to the economy are: destruction, disruption, diversion, dissaving and portfolio substitution.[3] Destruction refers to the direct costs of terrorism, as human and physical capital are destroyed through terrorist strikes. The disruption effect may, e.g., become manifest in higher transaction costs, as the effectiveness of public institutions is challenged and manipulated by terror, or as insecurity in general increases. Diversion occurs when public resources are shifted from output-enhancing to non-productive defence and security expenditures. Dissaving refers to a decline in savings that affects the economy's capital stock. Portfolio substitution means the flight of human, physical and financial capital from a country in the face of conflict. Through all these effects economic performance suffers, in particular as they may reinforce each other. Inter alia, Eckstein and Tsiddon (2004), Naor (2006) and Mirza and Verdier (2008) provide related theoretical considerations that also discuss how terror may act negatively on economic activity. In general, terrorism may distort the allocation of resources, basically through the disruption, diversion and portfolio substitution channel. It may also negatively influence resource accumulation, mainly via the destruction and dissaving channel.

[3] Frey et al. (2007) and Enders and Sandler (2008) bring forward similar theoretical channels of influence of terrorism on the economy. These studies also provide additional evidence on the macroeconomic consequences of terrorism that is not reported here.

Empirical evidence indicates that terrorism adversely influences international trade (Nitsch and Schumacher, 2004; Blomberg and Hess, 2006; Mirza and Verdier, 2008). Its unfavorable impact on tourism is well-documented, in particular for several Mediterranean countries (Enders and Sandler, 1991; Enders et al., 1992; Drakos and Kutan, 2003). Transnational terrorism also appears to distort domestic and foreign direct investment (Enders and Sandler, 1996; Fielding, 2003; Abadie and Gardeazabal, 2008). Blomberg et al. (2004) furthermore find that resources are relocated from investment to government spending in times of terrorist violence. A number of studies consequently detect a substantial negative influence of terrorism on overall economic growth (Abadie and Gardeazabal, 2003; Eckstein and Tsiddon, 2004; Crain and Crain, 2006; Gaibulloev and Sandler, 2008). In general, existing evidence suggests that terrorists are able to destabilize targeted economies. Here, economic activity is affected through various channels, e.g., through the destruction of national capital stocks, the disruption of trade or tourism flows, or the diversion of resources away from private investment, ultimately resulting in negative growth effects.

3.2.2 Potential Effects of Economic Performance on Terrorism

To reiterate an earlier line of reasoning, economic theory argues that terrorists are rational individuals choosing their levels of violent activity according to the costs and benefits arising from their actions (Sandler and Enders, 2004). Because of terrorists' presumed rationality the opportunity costs of terror also matter. Intuitively, low opportunity costs of violence (i.e., few prospects of economic activity) lead to elevated terrorist activity, whereas high opportunity costs result in the opposite (Freytag et al., 2011). Times of economic success mean, inter alia, more individual economic opportunities and participation. Higher levels of overall growth should coincide with higher opportunity costs of terror and thus less violence. Conversely, periods of economic downturn should be accompanied by fewer economic opportunities and participation and thus by more economic dissatisfaction. In times of economic crisis dissidents are more likely to resort to violence as the opportunity costs of terror are low, while the potential long-run payoffs from violence (i.e., a redistrib-

ution of scarce economic resources which is to be enforced by terrorism) are comparatively high (Blomberg et al., 2004b).

To some extent empirical evidence suggests that economic performance and terrorism are linked along the lines discussed before. The findings of Collier and Hoeffler (1998) indicate that higher levels of economic development coincide with lower likelihoods of civil war, providing initial evidence that economic success and conflict are diametrically opposed. Considering economic development and terrorism, several studies find that higher levels of development are obstacles to the production of transnational terrorism (e.g., Santos Bravo and Mendes Dias, 2006; Lai, 2007; Freytag et al., 2011). Blomberg and Hess (2008b) also find that higher incomes are a strong deterrence to the genesis of domestic terrorism. Furthermore, there is evidence connecting solid short-run economic conditions with less political violence (Muller and Weede, 1990; Freytag et al., 2011).[4] In general, the evidence indicates that terrorism and economic conditions are linked. Here, economic success seems to impede the genesis of terrorism, presumably due to higher opportunity costs of conflict. In other words, in times of stronger economic performance individuals simply have more to lose.

3.2.3 Research Contribution and Focus

Feasible theoretical reasoning and empirical evidence have been brought forward considering the effects of terrorism on growth and of growth on terrorism. Still, to the best of our knowledge no study has analyzed the causal nature of the terrorism-growth nexus. Also, due to data constraints past evidence has focused almost exclusively on transnational terrorism, although domestic terrorism is a far more common phenomenon (Enders and Sandler, 2008). With this contribution we want to add to existing empirical evidence by

[4] Evidence on the *targets* of transnational terrorism either finds that short-run and long-run economic conditions do not matter strongly for terrorists' attack decisions (Piazza, 2006; Drakos and Gofas, 2006; Kurrild-Klitgaard et al., 2006), or indicate that economically successful countries are more prone to terrorism (Tavares, 2004; Blomberg et al., 2004a). Attackers from abroad may not be deterred by increased economic opportunities in the country they attack. Instead, economic success may increase the payoffs from terrorist strikes. That is, the cost-benefit considerations of transnational attackers may differ from those of domestic terrorists.

providing a time-series analysis of Granger causality between domestic terrorism and economic growth. Multiple directions of causality are plausible. (1) Economic performance may Granger-cause terrorism, or (2) terrorism may Granger-cause performance. On the one hand, terrorism affects the allocation and accumulation of resources. On the other hand, economic performance may also impact the opportunity costs of terror. (3) If the two processes exist side by side, then feedback between them is detected. Such a relationship may hint at the existence of a vicious circle of conflict and economic decline, as previously discussed by Blomberg et al. (2006). Lastly, (4) a causal relationship between performance and terror in the statistical sense may also be non-existent when there is no evidence of substantial links.

In the next section we test for Granger causality between domestic terrorism and economic performance. We are well aware that economic growth and domestic terrorism may also be determined by other factors. For instance, economic growth may also be driven by geography, trade or institutions. Terrorism may, e.g., be determined by other economic or political factors. Thus, we also test for causality in trivariate time-series settings which include a related control variable. As a control, we choose changes in trade openness, as this variable may interact with growth as well as with terrorism.[5] On the one hand, trade may impact growth by, e.g., inducing specialization and technology diffusion, so changes in trade openness may translate into higher economic growth (Harrison, 1996; Edwards, 1998). On the other hand, trade may, e.g., be regarded as a threat by "globalization losers" when jobs are lost, or as an opportunity by "globalization winners" when trade increases wealth. Depending on which mechanism dominates, terrorism may increase or decrease with changes in trade openness as the opportunity costs of violence are affected.[6]

[5] One can argue that other factors potentially driving growth as well as terrorism should also be controlled for, such as the quality of economic institutions or political instability. We opt for trade openness because it matches our analysis on thereotical grounds and because data is available for all countries and time periods.

[6] Mirza and Verdier (2008) provide an overview of the terrorism-trade literature, focusing on transnational terrorism. It is reasonable to believe that at least some related findings can be transferred to the relationship between domestic terrorism and trade. Note that in the broader sense trade openness may also reflect the general quality of institutions (Rodrik, 2002). Better institutional quality should coincide with less terrorist activity.

3.3 Empirical Analysis

3.3.1 Data

We extract data on growth and terrorism for seven Western European countries. The countries of the analysis with their time horizons are: France (1951-2004), Germany (1971-2004), Greece (1952-2004), Italy (1951-2004), Portugal (1951-2004), Spain (1951-2004) and the United Kingdom (1951-2004), where data on Germany prior to 1990 relates only to West Germany. *Economic growth* is measured by the rate of real GDP per capita growth in 2000 constant prices. Data for growth comes from the *PENN World Table* of Heston et al. (2006). *Domestic terrorism* is indicated by the total number of individuals killed and wounded by acts of domestic terrorism in a given year and country. That is, we use raw data on terrorist victims (i.e., on the intensity of terror) rather than on terrorist attacks.[7] We transform the series by taking the natural logarithm and adding unity to allow for zero observations.[8] Data on domestic terrorism comes from the TWEED dataset compiled by Engene (2007).

We also test for terrorism-growth causality in a trivariate setting, using *changes in trade openness* as a control variable to reduce potential problems due to omitted variables. This variable is measured as the logarithm of the sum of exports and imports divided by real GDP in 2000 constant prices. Data for openness also comes from the PENN World Table.

3.3.2 Econometric Procedure

Below, we want to investigate the causal linkages between domestic terrorism and economic growth. We proceed as follows. (1) We conduct unit root tests to identify the order of

[7] When we use data on terrorist attacks, we cannot possibly evaluate the ferocity of such attacks. For instance, both a minor, politically motivated damage to property and a severe bombing with multiple casualties count as one attack. Intuitively, however, there ought to be a much stronger interaction between the bombing and economic factors.

[8] We use the natural logarithm to better account for outliers. We add unity to the observations in order to compute the natural logarithm also in those years when there were no victims from terrorist attacks. Note that by adequate data processing (as described later) we circumvent potential problems associated with "excess zeros" (i.e., when there are many observations without victims from terrorism). By using estimated rather than observed values for the terrorism series, "excess zero" problems do not arise.

integration of the investigated time series, and to check for potential breaks in the series. (2) As we need de-trended $I(0)$ time series to carry out the Granger causality analyses properly, we then process the data accordingly, building on the unit root test results. (3) We employ this processed data when we execute a number of causality tests using the Hsiao-Granger method (1969, 1979, 1982). First, we test for causality in bivariate settings, where we only consider the growth and terrorism series. Then, we also test for Granger causality in a trivariate scenario to broaden the evidence and to evaluate the robustness of our bivariate causality test results.

3.3.3 Unit Root Test

We first have to identify the order of integration of the investigated series. To ensure a correct application of the causality test, all series need to be $I(0)$, i.e., stationary and not exhibiting a unit root. As noted above, the series cover long time spans. Therefore, they may exhibit unexpected shifts (structural breaks) that are a consequence of, e.g., major structural changes in a country's economic or political realm. Conventional unit root tests do not account for structural breaks and therefore may produce biased results.

In order to account for possible breaks in the data, we use the unit root test (*ZA test*) of Zivot and Andrews (1992) which allows for a structural break. Through the ZA test the investigated series are identified as $I(1)$ (difference-stationary) or $I(0)$ with a break (trend-stationary). We use model C of the ZA test which allows for a break to occur in both intercept and trend. The test also gives the dates of the endogenously determined structural breaks, thus further unveiling underlying dynamics.[9]

Table 3.1 gives the results of the ZA test for all investigated series. For growth and terrorism the unit root test always indicates that the series are $I(0)$ with a trend. For trade openness the series are identified to be $I(1)$ in six out of seven cases. Table 3.1

[9]Note that when two or more series used simultaneously in the following causality analysis are found to be $I(1)$, further tests for cointegration would be required in order to account for long-run equilibrium relationships between the series. As two of the three series analyzed here are always $I(0)$, there is no need to discuss the issue of cointegration any further.

Country	Series	ZA Statistics	Break Date	Inference
France	Growth (G)	-6.722***	1974	I(0) + Trend
	Terrorism (T)	-5.636***	1989	I(0) + Trend
	Openness	-3.787	1982	I(1)
Germany	Growth (G)	-5.113**	1988	I(0) + Trend
	Terrorism (T)	-6.614***	1995	I(0) + Trend
	Openness	-3.904	1993	I(1)
Greece	Growth (G)	-10.006***	1974	I(0) + Trend
	Terrorism (T)	-5.934***	1985	I(0) + Trend
	Openness	-5.025	1973	I(1)
Italy	Growth (G)	-7.233***	1963	I(0) + Trend
	Terrorism (T)	-5.400**	1971	I(0) + Trend
	Openness	-2.917	1973	I(1)
Portugal	Growth (G)	-6.792***	1974	I(0) + Trend
	Terrorism (T)	-6.513***	1975	I(0) + Trend
	Openness	-5.125**	1974	I(0) + Trend
Spain	Growth (G)	-7.754***	1975	I(0) + Trend
	Terrorism (T)	-6.385***	1971	I(0) + Trend
	Openness	-4.606	1959	I(1)
UK	Growth (G)	-6.147***	1983	I(0) + Trend
	Terrorism (T)	-5.130**	1969	I(0) + Trend
	Openness	-3.593	1981	I(1)

Notes: (**), (***) indicates significance of the Zivot-Andrews Unit Root Test at 5% and 1% levels, that is, rejection of the hypothesis of unit root presence. Critical values are taken from Zivot and Andrews (1992).

Table 3.1: Zivot-Andrews Unit Root Test

also gives the calculated break dates. These break dates do not coincide across series for the same country. As expected, they fit in well with economic and political history. For instance, for Portugal, Spain and Greece most break dates coincide with their transition to democracy. For the United Kingdom, the structural break for the terror series matches the beginning of the "Troubles" in Northern Ireland. For France, the break date for the economic growth series coincides with the end of the "Thirty Glorious Years" of steady economic development. For the other countries, similar observations can be made.

3.3.4 Processing of Time-Series Data

Based on the results of the ZA test, we now process the time-series data in order to obtain $I(0)$ series. For six out of seven series on trade openness the ZA test indicates the existence of a unit root. Here, we achieve stationarity by simply taking first differences.

When the ZA test does not indicate a unit root, the series is $I(0)$ with a trend. This is the case for one openness series and all growth and terror series. If so, utilizing a difference filter to obtain stationarity is neither necessary nor useful. Instead, we de-trend the data following the method proposed by, inter alia, Fernandez (1997). We run an OLS regression of the following form:

$$y_t = \alpha + \beta t + \gamma DU_t + \delta D_t + \lambda DT_t + \hat{y}_t. \tag{3.1}$$

y_t is the dependent variable representing the respective series for growth, terror or openness. α is a constant, t is a time trend, and DU_t, D_t and DT_t take values depending on the calculated break date T_B: $DU_t = 1$ for $t < T_B$, 0 otherwise; $D_t = 1$ for $t = T_B$, 0 otherwise; $DT_t = (t - T_B)$ for $t > T_B$, 0 otherwise. $\hat{y}_t$ is the residual from the OLS estimation. By using this approach, we are able to eliminate trends and to take into account underlying structural breaks which may otherwise lead to biased results. We therefore use the de-trended residual data (i.e., $\hat{y}_t$,) in the subsequent causality analysis.

3.3.5 Hsiao-Granger Causality Test

Bivariate Causality Test

Tests for Granger causality are important tools in time-series analyses as employed, e.g., in Kollias et al. (2004). A potential shortcoming of standard Granger causality analyses is that they may suffer from arbitrary lag length selection because the considered time-series variables are constrained to all enter at the same lag length. This may yield inconsistent results due to model misspecifications (Braun and Mittnik, 1993). We hence rely on the sequential approach of Hsiao (1979, 1982) to test for Granger causality, which in particular

circumvents problems associated with lag length selection. Applications of this causality testing procedure are, e.g., given in Cheng (1999) and Bajo-Rubio and Montávez-Garcés (2002), besides the ones in Hsiao (1979, 1982).

Granger's (1969) definition of non-causality states that if it is easier to predict a series x_t when including information from a series y_t instead of only employing lagged values of x_t, then y_t Granger-causes x_t, denoted $y_t \Rightarrow x_t$. Bidirectional causality (feedback) is present when x_t also Granger-causes y_t. By combining this definition of Granger causality with Akaike's (1969) *Final Prediction Error* (*FPE*), we can apply Hsiao's approach toward testing for causality between time series.

In its basic form, the causality testing procedure requires us to first consider an autoregressive process:

$$y_t^* = \alpha + \sum_{i=1}^{m} \beta_i(L) y_t^* + u_t. \tag{3.2}$$

In Equation (3.2), $\sum(L)$ indicates the lag order of the series running from 1 to m. u_t is a white noise term with the usual statistical properties and α is a constant term. y_t^* is operationalized depending on the previous ZA tests. If the series is $I(0)$ with a trend, we employ the residuals obtained from Equation (3.1), $\hat{y}_t$. If the series is $I(1)$, we use the usual difference filter where y_t^* is equal to $(y_t - y_{t-1})$ in order to obtain stationarity. Note that we here use estimated rather than observed values of y, potentially making additional interpretative caution necessary. We choose the lag order that yields the smallest FPE, denoted $FPE_{y^*}(m^*, 0)$. The individual FPE are calculated from the following equation with lags varying from 1 to m:

$$FPE_{y^*}(m, 0) = \frac{(T + m + 1)}{(T - m - 1)} \times \frac{RSS}{T}. \tag{3.3}$$

Here, T is the number of observations and RSS is the residual sum of squares. Then, we allow another variable x_t^* to enter our model, so we receive the subsequent vector

autoregression model (VAR):

$$y_t^* = \alpha + \sum_{i=1}^{m} \beta_i(L) y_t^* + \sum_{j=1}^{n} \gamma_j(L) x_t^* + u_t, \tag{3.4}$$

$$x_t^* = \alpha + \sum_{j=1}^{n} \gamma_j(L) x_t^* + \sum_{i=1}^{m} \beta_i(L) y_t^* + v_t. \tag{3.5}$$

u_t and v_t are white noise terms with the usual statistical properties, and α is a constant. $\sum(L)$ is the lag operator indicating the lag order of the series, where y_t^* and x_t^* again take values based on the previous ZA tests. Either they represent the residuals obtained from Equation (3.1), or they are difference-stationary series where the usual difference-filter has been employed. Note that in both cases the series are now $I(0)$, so the causality testing procedure can be conducted properly. While y_t^* steadily enters Equation (3.4) with the lag order from Equation (3.2) that yields the smallest FPE, m^*, x_t^* enters with a sequence of lags varying from 1 to n. The FPE of Equation (3.4) are computed, with the specific lag order being chosen that generates the smallest FPE, denoted as $FPE_{y^*}(m^*, n^*)$, from:

$$FPE_{y^*}(m^*, n) = \frac{(T + m + n + 1)}{(T - m - n - 1)} \times \frac{RSS}{T}. \tag{3.6}$$

By comparing the two minimal FPE, we can draw conclusions regarding causality. If $FPE_{y^*}(m^*, 0) > FPE_{y^*}(m^*, n^*)$, then $x_t^* \Rightarrow y_t^*$, thus Granger causality is established. If $FPE_{y^*}(m^*, 0) < FPE_{y^*}(m^*, n^*)$, then $x_t^* \not\Rightarrow y_t^*$ and no Granger causality is detected. Testing for Granger causality running from y_t^* to x_t^* requires us to repeat the previously described steps this time with x_t^* being the dependent variable, so we ultimately arrive at Equation (3.5).

Trivariate Causality Test

It is a well-known fact that causality tests in bivariate settings may produce inconsistent results. Lütkepohl (1982) shows that whether or not Granger causality is detected in a bivariate specification may be due to omitted variables. In order to reduce the possibility

of omitted variables, we transform our bivariate model into a trivariate one by including a control variable.

Methodologically, we build on the previously discussed procedure. Again we are interested in the causal relationship between the series y_t and x_t. Therefore, we first consider an autoregressive process as in Equation (3.2) and determine the corresponding minimal FPE as in Equation (3.3). Then, we consider a bivariate VAR similar to Equation (3.4), where we add a new variable z_t as a control variable (in our case trade openness dynamics). We calculate the minimal FPE as in Equation (3.6). Next, we consider a trivariate VAR, where x_t enters with lags varying from 1 to p, while y_t^* and z_t^* enter the model with the lag order that yields the smallest FPE, $m^*$and n^*. It has the following form:

$$y_t^* = \alpha + \sum_{i=1}^{m} \beta_i(L) y_t^* + \sum_{k=1}^{n} \delta_j(L) z_t^* + \sum_{j=1}^{p} \gamma_j(L) x_t^* + u_t, \tag{3.7}$$

$$z_t^* = \alpha + \sum_{k=1}^{n} \delta_j(L) z_t^* + \sum_{i=1}^{m} \beta_i(L) y_t^* + \sum_{j=1}^{p} \gamma_j(L) x_t^* + v_t. \tag{3.8}$$

$$x_t^* = \alpha + \sum_{j=1}^{p} \gamma_j(L) x_t^* + \sum_{i=1}^{m} \beta_i(L) y_t^* + \sum_{k=1}^{n} \delta_j(L) z_t^* + v_t. \tag{3.9}$$

The corresponding FPE is computed, with the specific lag order being chosen that generates the smallest FPE, denoted as $FPE_{y^*}(m^*, n^*, p^*)$, from the following equation with the known notation:

$$FPE_{y^*}(m^*, n^*, p) = \frac{(T + m + n + p + 1)}{(T - m - n - p - 1)} \times \frac{RSS}{T}. \tag{3.10}$$

By comparing the two minimal FPE from the bivariate and trivariate VAR, we can draw conclusions on causality. If $FPE_{y^*}(m^*, n^*, 0) > FPE_{y^*}(m^*, n^*, p^*)$, then $x_t^* \Rightarrow y_t^*$; Granger causality is established, conditional upon the presence of z_t. If $FPE_{y^*}(m^*, n^*, 0)$ $< FPE_{y^*}(m^*, n^*, p^*)$, then $x_t^* \not\Rightarrow y_t^*$ and no Granger causality is detected. In order to test for causality from y_t^* to x_t^*, we would have to repeat the procedure the other way around.

Bivariate Causality Test Results

Table 3.2 gives the results of the bivariate tests for causality running from terrorism to real GDP per capita growth. Our results indicate that terrorism causally sways economic growth only in the case of Portugal. For all other countries we do not detect a causal link. That is, it seems as if strong and developed economies are able to endure terrorist violence without suffering major negative growth effects. Rather, they seem to be able to absorb risk associated with domestic terrorism. This is in line with Enders and Sandler (2008) who also argue that economies that are diversified and exhibit well-developed institutions are generally able to withstand the adverse macroeconomic effects of terrorism.

Also in Table 3.2, we report our findings on causality running from growth to terrorism. Here, economic growth *always* exerts a causal influence on terrorist violence. That is, we can assume that economic growth affects the terrorists' calculus by having an impact on the opportunity costs of violence. Economic success allows for more economic participation and opportunities, thus making violence more costly. The contrary is expected to hold for times of economic decline.

In general, for our sample we do not find strong support that economic growth is affected by violence. Rather, targeted economies appear to be stable enough to withstand the threat of domestic terrorism without suffering major economic setbacks.[10] We find that growth causes domestic terrorist violence for all seven countries. For Portugal there is in addition evidence for causality running from terrorism to growth, establishing bidirectional Granger causality (feedback). In the bivariate model specification, a strong link runs from economic growth to terrorist violence, presumably as the opportunity costs of political violence are impacted. This is in line with previous empirical findings which attribute a strong role to economic factors in shaping the patterns of conflict and terrorist violence (e.g., Collier and

[10] We are well aware that terrorism may substantially damage certain sectors of the economy. We hinted at corresponding evidence in the literature review of this chapter and also in the introduction to this thesis. Similarly, terrorist violence may constrain economic growth in regions most affected by conflict. For our sample this may apply to the Basque country and Northern Ireland, as corresponding evidence by Abadie and Gardeazabal (2003) and Fielding (2003) suggests. Our analysis simply provides little evidence that such economic damages feed through to overall growth at national levels.

Hoeffler, 1998; Blomberg et al., 2004a; Blomberg and Hess, 2008b; Freytag et al., 2011).

Country	FPE (m,0)	FPE (m,n)	F-Stat	T ⇒ G	FPE (m,0)	FPE (m,n)	F-Stat	G ⇒ T
France	2.1184 (1,0)	2.3718 (1,1)	0.236	NO	1.8558 (1,0)	1.7156 (1,1)	1.453	YES
Germany	2.0725 (4,0)	2.4928 (4,2)	2.651**	NO	0.8187 (1,0)	0.6665 (1,2)	3.268**	YES
Greece	6.8433 (1,0)	7.0927 (1,5)	1.254	NO	0.5640 (1,0)	0.5287 (1,1)	0.349	YES
Italy	4.0109 (1,0)	4.0169 (1,1)	0.128	NO	1.4802 (1,0)	1.3581 (1,1)	0.630	YES
Portugal	9.2646 (1,0)	8.5833 (1,1)	0.917	YES	0.2965 (5,0)	0.2655 (5,3)	3.102***	YES
Spain	6.5819 (1,0)	8.5833 (1,1)	0.917	NO	0.5009 (6,0)	0.2798 (6,3)	2.753**	YES
UK	3.2292 (2,0)	3.4394 (2,1)	1.404	NO	1.1821 (1,0)	1.1774 (1,1)	1.112	YES

Notes: FPE (m,0) indicates the minimal FPE of an autoregressive process with the optimal lag length m*. FPE (m,n) indicates the minimal FPE of the two variable VAR process with the optimal lag lengths m* and n*. We allow for a maximum of six lags. (**) and (***) denote significance of the joint F-statistics at 5% and 1% levels, respectively.

Table 3.2: Terrorism-Growth Bivariate Causality Test

Trivariate Causality Test Results

We have already argued that care should be taken interpreting bivariate causality test results due to the possibility of misleading results. Table 3.2 has given an initial hint that such caution could be appropriate for our analysis. The reported joint F-statistics are not always significant, indicating that our causality inferences may be spurious. To reduce potential bias due to omitted variables and to raise the explanatory power of our analysis, we also test for Granger causality between domestic terrorism and economic growth, conditional upon the presence of changes in trade openness. Earlier, we already outlined the underlying mechanisms. On the one hand, trade may influence growth, e.g., via increased specialization, technological diffusion or efficiency gains. On the other hand, trade

may also influence terrorist activity, mainly by affecting the opportunity costs of violence. That is, from a theoretical point of view there is the possibility that trade openness may drive growth as well as terrorism. By accounting for the dynamics of trade openness in a trivariate system, we are able to reduce inconsistent causality inferences which may have resulted from the omission of trade openness in a bivariate model.

Table 3.3 gives the results of the trivariate Granger causality tests running from terrorism to real GDP per capita growth. The link from terrorism to growth found in the bivariate system for Portugal is not detected in the trivariate case. Concerning Germany and Spain, we interpret our results as in Triacca (1998), also concluding that there is *no* causal relationship from terrorism to growth for these countries. In the bivariate system for these two countries we have already documented that there is no Granger causality running from terrorist violence to economic growth; in the trivariate system, the comparison between the two FPE now only seems to suggest a causal effect from terror to growth. Following Triacca (1998), we argue that it is actually trade openness—i.e., the omitted variable in the bivariate system—that causes growth, and *not* terrorism.[11] For Germany and Spain Granger causality does not run from terrorist violence to growth. To sum up, when including information on trade openness dynamics in a higher dimensional process, we are unable to discover any statistical causality effect of terrorism on economic growth. This confirms our earlier interpretation that attacked economies have been successful in coping with the threats of domestic terrorism. We attribute this resilience to the strength of the markets and institutions of attacked economies (Enders and Sandler, 2008).

With respect to the link from economic growth to terrorism, the results displayed in Table 3.3 show that economic growth Granger-causes terrorism now only in the cases of Germany, Portugal and Spain. Note that for these cases the joint F-statistics now always indicate significance, adding to the reliability of the causality inferences. For France,

[11] Formally, Triacca (1998) provides proof for the following argument: If a variable Y_3 does not cause Y_1 in a bivariate system, but in a trivariate one where the variable Y_2 is also included, then Y_2 must cause Y_1 in the bivariate and trivariate system. We apply his proof to our causality evidence for Germany and Spain, where Y_1 is economic growth, Y_2 is trade openness and Y_3 is terrorist violence.

Greece, Italy and the United Kingdom we cannot confirm our causality findings from the bivariate specification. That is, we still find some evidence for the idea that terrorism is influenced by growth through the latter's effect on the opportunity costs of violence. Conditional upon the presence of information on trade openness, the influence of economic performance on terrorism generally becomes less pronounced.

In general, the Granger causality test results of the trivariate setting only partially confirm those of the bivariate analysis. On the one hand, the additional evidence supports our idea that attacked economies have been successful in adjusting to terrorist violence, thereby not incurring costs in the form of reduced growth. We do not detect any Granger causality running from terrorism to growth in trivariate systems. On the other hand, we should probably not overestimate the determining effect of economic performance on terrorism, as we see related causal relationships only for Germany, Portugal and Spain. This supports the evidence provided by, inter alia, Freytag et al. (2011) on the effect of income growth on terrorism. Still, the missing links for the other four countries of our sample also support views that are more skeptical of the impact of economic variables on terrorism (e.g., Abadie, 2006; Kurrild-Klitgaard et al., 2006).

3.4 Discussion

3.4.1 Policy Implications

The results of our Hsiao-Granger causality analysis indicate that at least in some countries in Western Europe economic factors played an important role in shaping terrorist violence after the Second World War. In general, we provide support for policies that aim at increasing the opportunity costs of terror, as, e.g., advocated by Frey and Luechinger (2003). Apparently, economic success (especially in Germany, Portugal and Spain) helped to reduce political violence by raising the opportunity costs of terrorism. Policies that focus on growth and economic development are thus also potentially helpful in scaling down terror risks. Related policies could yield additional dividends beyond raising economic status, as

Country	FPE (m,n,0)	FPE (m,n,p)	F-Stat	T ⇒ G	FPE (m,n,0)	FPE (m,n,p)	F-Stat	G ⇒ T
France	2.3739	2.4408	0.661	NO	1.7136	1.7778	1.338	NO
	(1,1,0)	(1,1,1)			(1,1,0)	(1,1,1)		
Germany	2.5289	2.4753	2.61**	NO^{+}	0.6335	0.5894	4.23^{a}	YES
	(4,1,0)	(4,1,2)			(1,1,0)	(1,1,2)		
Greece	7.1225	7.1755	1.262	NO	0.5345	0.5556	0.378	NO
	(1,1,0)	(1,1,5)			(1,1,0)	(1,1,1)		
Italy	4.0602	4.1992	0.106	NO	1.4085	1.4303	0.516	NO
	(1,1,0)	(1,1,1)			(1,1,0)	(1,1,1)		
Portugal	8.6179	8.7752	0.868	NO	0.2966	0.2692	2.892**	YES
	(1,1,0)	(1,1,1)			(5,1,0)	(5,1,3)		
Spain	6.2268	5.9240	3.093**	NO^{+}	0.5113	0.4809	2.193**	YES
	(1,3,0)	(1,3,1)			(6,1,0)	(6,1,6)		
UK	3.1570	3.2664	2.095***	NO	1.1727	1.2052	0.872	NO
	(2,2,0)	(2,2,1)			(1,1,0)	(1,1,1)		

Notes: FPE (m,n,0) indicates the minimal FPE of the bivariate VAR with the optimal lag lengths m^* and n^*. FPE (m,n,p) indicates the minimal FPE of the trivariate VAR with the optimal lag lengths m^*, n^* and p^*. We allow for a maximum of six lags. (*), (**) and (***) denote significance of the joint F-statistics at 10%, 5% and 1% levels, respectively. (+) indicates that causality is driven by the control variable. See the text for a further discussion.

Table 3.3: Terrorism-Growth Trivariate Causality Test

social stability and peace may also be affected. For Western Europe developed welfare states may provide important institutional channels for disseminating economic success, likewise explaining a link from economic performance to domestic terrorism.[12] Our results also indicate that domestic terrorist violence did not affect GDP per capita growth on national levels. Affected economies seem to have been generally successful in dealing with terror risks. Markets and institutions appear to have adjusted effectively to terror risks.

In general, (1) policies that aim at improving economic status should also be pursued because they may robustly reduce the propensity towards domestic terrorism at least in some countries. The opportunity costs of violence and the general influence of economic factors on terror should not be disregarded. (2) Policies that aim to increase the efficiency of markets and institutions should also be undertaken because they help to protect economies

[12] See Burgoon (2006) for an in-depth discussion of the potential links between terrorism and welfare policies. The study by Krieger and Meierrieks (2010)—which is virtually identical to the second chapter of this doctoral thesis—is an explicit empirical analysis of the effect of welfare policies on domestic terrorism in Western Europe, which finds that such policies may work as tools for scaling down terrorism.

from the negative effects of terrorism by sustaining or further increasing markets and institutions' resiliency to terrorist attacks.

3.4.2 Caveats

Several caveats can be brought forward with respect to our analysis. (1) Our evidence is region-specific, so the results may not hold for other world regions. These regions may exhibit less developed markets and institutions, so they are more prone to terror-induced shocks. Additionally, the relationship between economic factors and terrorism may be less pronounced. For instance, the study of Piazza (2007) for the Middle East suggest that other factors (political instability, state failure etc.) matter more strongly to terrorism in this part of the world. (2) We only look at domestic terrorism. On the one hand, domestic terrorism is a more common phenomenon than transnational terrorism, so we should be able to thoroughly assess the interaction between terrorism and economic performance with our data. On the other hand, transnational terrorism may also contribute to this interaction, potentially amplifying the effects indicated by our analysis.[13] (3) With respect to our policy advice, we acknowledge that terrorism is caused not only by economic factors. Economic success is not a panacea for terror. For instance, political participation may also be helpful as it influences the opportunity costs of violence as well (Frey and Luechinger, 2003). This is in particular true for conflict that is also obviously codetermined by political factors, e.g., as in the case of ETA (Barros, 2003).

3.5 Conclusion

In this contribution we tested for Granger causality between domestic terrorism and real GDP per capita growth. Using the Hsiao-Granger method to detect causality in time series,

[13] However, clearly differentiating between domestic and transnational terrorism (as in our analysis) may be helpful to keep apart potentially different terrorists' calculi. As discussed before, transnational terrorists may be driven by other cost-benefit considerations than domestic terrorists. For instance, while transnational terrorists may find it attractive to attack rich countries because of the increased benefits of such attacks, domestic terrorists may reduce attacks at the same time due to the increased opportunity costs of violence.

we were able to circumvent several common problems associated with causality analyses in time-series frameworks. We tested for causality in a bivariate and trivariate setting in order to provide robust results.

We found that (1) all investigated growth and terror series exhibit structural breaks matching major turning points in the countries' economic and political history. (2) In bivariate systems, economic growth leads terrorist violence in all cases, whereas terrorism causally influences growth only for one country (Portugal). These results indicated that economic performance influences the terrorists' calculus, while attacked economies are generally resistant to domestic terrorism. (3) We noted that bivariate causality tests may be prone to inconsistencies, so we also performed causality tests in trivariate systems, including trade openness dynamics as an additional control variable. The findings confirmed that economies under attack are successful in adjusting to the threats of terror, so economic growth is not impaired. With respect to causality running from growth to terrorism, the results weakened those of the bivariate analysis. Economic performance robustly sways the terrorists' calculus only for Germany, Portugal and Spain, but not for France, Greece, Italy and the United Kingdom. Solid growth in some countries may raise the opportunity costs of terror, thus discouraging violent behavior, e.g., as individuals find more (non-violent) opportunities of economic participation. In the light of our results, policymakers should therefore not underestimate the role of economic factors (and the role of the opportunity costs of violence) in impacting domestic terrorism. For some countries economic success apparently has contributed to a crowding out of domestic terrorist violence. However, factors other than economic performance should also be considered when explaining terrorism dynamics, in particular when the links between economic growth and domestic terrorist violence are not found to be strong.

Given our empirical results, research should continue with analyzing the terrorism-growth relationship. With regard to methodology, additional instruments of time-series analysis may be used to further refine econometric analyses of the terrorism-growth nexus. With regard to content, future research may investigate this nexus for other parts of the

world (e.g., the Middle East), for certain periods of time (e.g., the Cold War era) or for specific kinds of terrorism (e.g., left-wing or Islamic terrorism) aimed at certain targets (e.g., U.S. citizens) to see whether terrorism-growth dynamics change substantially in such analytical settings.[14]

[14]For instance, Barros and Proença (2005) analyze which characteristics are associated with Islamic terrorist attacks in North America and Europe. Barros et al. (2007) scrutinize which factors influence the likelihood of US citizens to fall victim to a terrorist attack in Europe. That is, these studies investigate terrorist behavior with respect to the ideological affiliation and choice of target. Such analytical approaches may, amongst others, be useful to expand the empirical literature, also with respect to the terrorism-growth nexus.

Chapter 4

Economic Performance and Terrorist Activity in Latin America

This chapter is a joint work with Thomas Gries. A virtually identical version of this paper is due to be published in 2012 in Defence and Peace Economics.

4.1 Introduction

Terrorism is often regarded as a danger to economic growth and prosperity. Amongst others, it is the destabilizing effect of terrorism on economic activity that necessitates its suppression. Many scholars suggest that terrorism can be fought best by increasing the opportunity costs of terrorism (Frey and Luechinger, 2003), especially given that military means—which primarily aim at increasing the material costs of terrorism—have not proven overly successful (e.g., Azam and Thelen, 2010; Feridun and Shahbaz, 2010). Here, one prominent suggestion to increase these very opportunity costs is to stimulate economic activity, so as to provide (potential) terrorists and their supporters with additional economic alternatives to violence (e.g., employment) and opportunities for economic participation.

These lines of argumentation point at a potentially complex causal relationship between terrorism and economic growth. On the one hand, terrorism may negatively determine economic activity. On the other hand, strong economic activity may lead to less terrorism. However, most studies on the causes and macroeconomic consequences of terrorism—reviewed in the introduction to this doctoral thesis and also below—ignore this potentially complex interaction (e.g., Piazza 2009: 406-407) and instead *a priori* assume

a relationship between terrorism and economic growth that clearly differentiates between "cause and effect".[1]

In this contribution we empirically assess the causal interaction between economic performance and terrorism for 18 Latin American countries, where we explicitly consider the potentially complex nature of this interaction.[2] We focus on a sample of Latin American and Caribbean countries for several reasons. First, very few studies—referred to below—have discussed the determinants and consequences of terrorism for this part of the world, particularly with respect to the terrorism-economy nexus. Thus, our study aims to add to the sparse evidence on these issues.

Second, Latin America experienced notable economic fluctuations and periods of terrorist activity during our observation period. Figure 4.1 illustrates the patterns of economic performance and terrorism between 1970 and 2007.

Third, given the ideological profile of many terrorist groups that operated in Latin America during this period, a close association between economic factors and terrorism is highly intuitive. In fact, most of terrorist activity was carried out by groups who explicitly opposed the socio-economic status quo. Examples of such groups with social-revolutionary or leftist agendas are the *Ejército Revolucionario del Pueblo* (*ERP*) in Argentina, the *Movimiento de Izquierda Revolucionaria* (*MIR*) in Chile, the *Ejército Zapatista de Liberación Nacional* (*EZLN*) in Mexico, the *Alfaro Vive, Carajo (AVN)* in Ecuador and the *Ejército de Liberación Nacional (ELN)* in Colombia.[3] Many of these groups, which consistently emphasized their goal of redistributing wealth in favor of the poor, emerged in the late 1960s and 1970s when poor economic conditions abounded (Lopez, 1988). Given their ideological alignment, many of these groups are expected to have been highly re-

[1] Recent examples that, unlike the empirical mainstream, take into account potential complexities in the terrorism-economy nexus are Araz-Takay et al. (2009) who focus their empirical study on Turkey. The study by Gries et al. (2011)—which is a nearly identical to the third chapter of this doctoral thesis—is another example.

[2] The countries in our sample are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

[3] For another overview of the history of terrorism in Latin America, see, e.g., Lopez (1988), Wickham-Crowley (1990), Gorriti (1991), Feldmann and Perälä (2004), and Feldmann (2005).

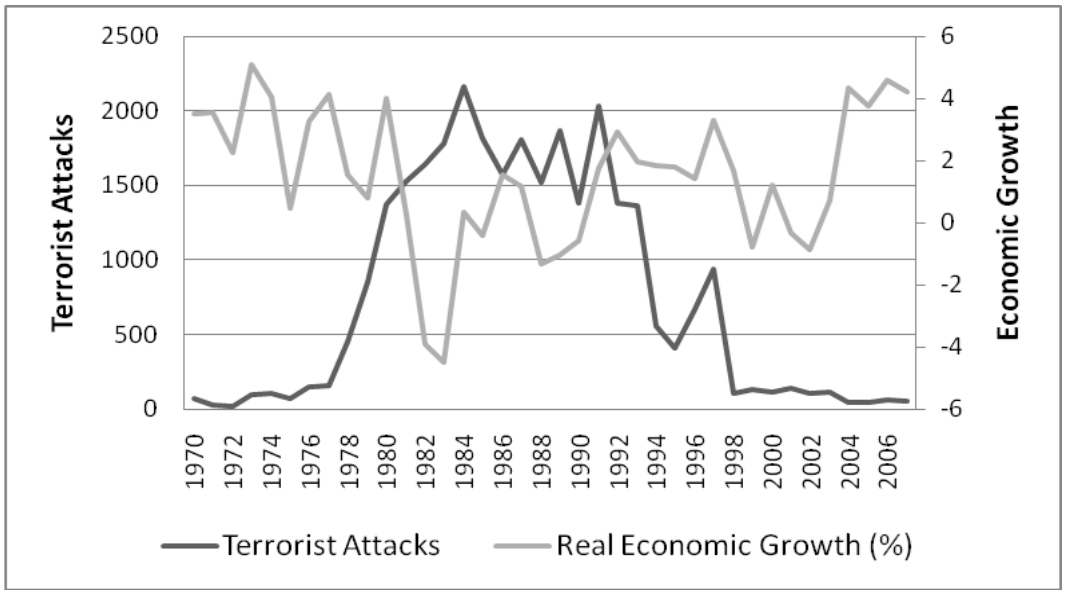

Figure 4·1: Terrorism and Economic Growth in Latin America, 1970-2007

sponsive to socio-economic change, suggesting a causal effect from economic performance to terrorism. By contrast, groups with different ideological profiles that have operated in other parts of the world are expected to be less responsive to such changes, given that they are more geared to territorial claims (*nationalist-separatist terrorism*) or socio-cultural changes motivated by religious doctrine (*religious terrorism*).[4] At the same time, it seems intuitive to assume that terrorist groups in Latin America have used terrorism to produce economic damage, thereby weakening opposing governments and facilitating politico-economic change. Even though insurgent activity in Latin America has rarely led to the defeat of the incumbent government (cf. Gorriti, 1991), imposing costs on the government in terms of reduced economic activity may have nevertheless helped to settle conflict through negotiation, which suggests a causal link from terrorism to growth.

[4]Note that terrorist activity in Latin America can to a lesser extent also be traced back to counter-revolutionary right-wing groups (e.g., the *Alianza Anticomunista Argentina*, *AAA*, in Argentina and the *Autodefensas Unidas de Colombia*, *AUC*, in Colombia) and drug-trafficking (*narco-terrorism*). The rationale of the terrorism-economy nexus (outlined below) is expected to apply to these forms of terrorism, too, given that they also ought to be markedly responsive to economic fluctuations (e.g., Dishman, 2001).

Fourth, some evidence—reviewed below—indicates that the roots of terrorism are heterogeneous across different parts of the world, so that economic variables may matter to terrorism for some countries—or types of terrorism—but not necessarily for all. Then, a focus on Latin America ought to make it less likely for heterogeneity in the roots of terrorism and in the capability of terrorism of inflicting economic damage to become an issue, since the countries in this part of the world share a similar history and culture and have similar socio-economic and politico-institutional traditions and structures.

The remainder of this contribution is organized as follows. The next section discusses the existing literature on the relationship between economic growth and terrorism, so as to illustrate the potential complexities in this relationship. While some parts of the literature review re-iterate earlier discussions in the introduction to this thesis and in Chapter 3, it also relates this discussion to the Latin American experience to demonstrate that an analysis of the terrorism-economy nexus is particularly promising for this part of the world. Then, we describe our data before we investigate the causal interaction between growth and terrorism for 18 Latin American countries from 1970 to 2007 in order to explore which hypothesis regarding the terrorism-economy nexus suits the Latin American experience best. Afterwards, we introduce and discuss the findings from a series of negative binomial regressions that aim at strengthening confidence in our panel causality analysis results. The final section concludes.

4.2 Causality Between Economic Growth and Terrorism: Theory, Evidence and the Latin American Experience

4.2.1 Causality from Economic Growth to Terrorism

The main hypothesis when considering a causal link from the economy to terrorism is that poor economic conditions lead to more terrorist activity. This hypothesis follows from a rational-choice perspective on terrorist behavior. Terrorists can be regarded as rational actors who seek to maximize their utility from terrorism, subject to budget constraints

(money, manpower etc.) and a certain set of costs, benefits and opportunity costs associated with terrorism (e.g., Sandler and Enders, 2004). Accepting that terrorists are rational actors, we can identify the channels (e.g., recruitment, popular support) through which poor economic conditions may lead to more terrorism. Here, country-specific factors such as national economic conditions affect the terrorists' cost-benefit matrix. On the one hand, reduced economic activity means lower terrorism costs, e.g., because economic disparity makes it easier (less costly) for terrorist organizations to find support and recruits, especially given that the opportunity costs of violence (non-violent opportunities of economic participation) are limited in poor economic times. On the other hand, poor economic conditions also mean that the potential pay-off from terrorism is more rewarding. For example, Blomberg et al. (2004a, b) introduce an economic model of terrorism in which limited access to economic resources (as indicated by, e.g., low economic growth) increases the propensity of groups to resort to terrorism in order to change the economic status quo, given that the pay-off in the event of terrorist success (i.e., a redistribution of economic resources) is comparatively attractive. There is also some empirical support—mostly from large-N studies—for the notion that economic variables (income levels, economic growth etc.) matter to terrorism (e.g., Blomberg et al., 2004b; Lai, 2007; Blomberg and Hess, 2008b; Krieger and Meierrieks 2010). For instance, Blomberg et al. (2004b) find that economic downturns correlate with increased transnational terrorist activity.

As shown above in Figure 4.1, between 1970 and 2007 Latin America experienced repeated economic downturns that indicated a deteriorating socio-economic environment. These recurrent economic declines may have contributed to the emergence of left-wing social-revolutionary groups that "resorted to violence to repudiate what they perceived to be decadent and inegalitarian bourgeois societies that produced a steady deterioration of economic conditions for the middle and lower classes" (Feldmann and Perälä 2004: 106-107). That is, it seems intuitive that the aforementioned theoretical mechanisms have also been at work in Latin America. First, slow growth is likely to have fuelled popular support for terrorism and lowered its costs (e.g., by facilitating recruitment). Second, the

limited access to economic resources—as indicated by poor growth—may have made it more likely for terrorism to emerge that was geared to changing these unfavorable conditions. Here, the ideological profile of many terrorist organizations also makes a link from poor economic conditions to terrorism for Latin America plausible. The eventual economic success of many Latin American countries can be expected to have contributed to a decline in terrorist activity, given that many terrorist groups in Latin America are likely to have been highly responsive to economic improvements.

However, it can also be argued that there are no strong causal links between the economy and terrorism in Latin America. The empirical evidence offered by Feldmann and Perälä (2004) indicates that transnational terrorist activity in Latin America has been more strongly linked to internal political and institutional (e.g., human rights violations, a deficient rule of law etc.) than to economic factors.[5] For instance, some countries (e.g., Argentina and Chile) experienced military coups that were associated with widespread human rights abuses, so that terrorism may have also resulted from these politico-historic (and not economic) circumstances. Also, during the Cold War many Latin American terrorist organizations were supported by one of the two superpowers (Gorriti, 1991). As Feldmann and Perälä (2004) note, several left-wing groups (e.g., the *Fuerzas Armadas Revolucionarias de Colombia*, *FARC*, in Colombia and the *Fuerzas Armades Rebeldes*, *FAR*, in Guatemala) received assistance (weapons, funds, training etc.) from the Soviet Union and Cuba. By contrast, counter-revolutionary groups (e.g., the *Contras* in Nicaragua) were supported by the United States. Terrorism may hence have been driven more strongly by the dynamics of the international political system than by socio-economic variables.

The view that the economy did not matter to the patterns of terrorism in Latin America between 1970 and 2007 is also in line with the majority of large-N studies on the determinants of terrorism, as reviewed by Gassebner and Luechinger (2011) and Krieger

[5] As defined above, *transnational terrorism* involves more than one country (e.g., because terrorist groups attack foreigners). As already discussed in the introduction, an analysis that focuses on the causes of transnational terrorism may yield different results than one that focuses on the causes of *domestic terrorism* (which only involves one country) or terrorism in general (i.e., domestic and transnational terrorism). This argumentation is also re-iterated below.

and Meierrieks (2011). Rather, most studies find that terrorism is rooted in, e.g., poor political and institutional conditions (e.g., Krueger and Maleckova, 2003; Li, 2005; Piazza, 2008, 2009), a low degree of international economic integration (e.g., Kurrild-Klitgaard et al., 2006), poor demographic conditions such as ethnic tensions (Basuchoudhary and Shughart, 2010), and foreign policy activities that create grievances and lead to an internationalization of domestic conflict (e.g., Savun and Phillips, 2009; Azam and Thelen, 2010).

However, it is also possible that causality from the economy to terrorism follows a *heterogeneous pattern*. Such a perspective implies that both the affirmative (postulating a universal effect of the economy on terrorism) and the strongly skeptical view (postulating no effect of the economy on terrorism) regarding the terrorism-economy nexus are lopsided. Heterogeneous causation from economic conditions to terrorism would mean that economic growth reduced terrorism in some but not all Latin American countries. Importantly, the effect of economic conditions on terrorism may have depended on a country's level of development. First, populations in less developed economies ought to have a comparatively stronger need for socio-economic progress, so that they can be expected to attach higher importance to economic circumstances when, e.g., considering supporting or joining a terrorist organization. Second, less developed countries can be expected to be more vulnerable to economic shocks. This is because a country's level of economic development usually correlates strongly with its level of institutional and state capacity (e.g., Chong and Calderon, 2000; Fearon and Laitin, 2003). For instance, countries with a lower level of institutional and state capacity are less likely to offer efficient means of economic participation (e.g., social welfare systems) to ameliorate economic grievances, or to introduce sound economic policies (e.g., fiscal stimulus) to counter economic downturns. Thus, economic factors are anticipated to play a stronger role in the calculi of (potential) terrorists and their supporters in less developed economies.

Following the view that causality from the economy to terrorism is heterogeneous for Latin America, we may expect economic conditions to have mattered particularly for the

less developed economies, whereas non-economic factors may have played a stronger role in more developed economies where economic grievances ought to have been less pronounced. For example, the aptly named *Ejército Guerrillero de los Pobres* (*Guerrilla Army of the Poor, EGP*) of less developed Guatemala can be argued to have been more strongly motivated by socio-economic grievances than Chile's *Frente Patriótico Manuel Rodríguez* (*FPMR*), which emerged as an armed resistance group against the Pinochet regime.

4.2.2 Causality from Terrorism to Economic Growth

As concerns a causal link from terrorism to the economy, the main hypothesis is that terrorist activity leads to reduced economic activity (i.e., poor economic performance). Here, the rationale of terrorists to destabilize the economy can again be deduced from rational-choice theory. A government that is attacked by terrorists may take on a rational perspective, where it weighs the cost of giving in to (at least some) terrorist demands against the cost of a prolonged terrorist campaign that results from continued resistance by the government (e.g., Sandler and Enders, 2008). Consequently, economic destabilization is a central goal of terrorists. Economic damage due to terrorism means that accommodating terrorists' demands becomes comparatively less costly (i.e., more likely) from the government's perspective. Here, terrorism is expected to destabilize the economy by inflicting direct damage and by inducing behavior that results in unfavorable economic outcomes (e.g., by affecting the allocation and accumulation of resources).[6] The direct costs, which are not necessarily substantial, relate to the loss of human life and the damage to property and infrastructure. The indirect costs result from the response of economic agents to terrorism. For instance, security measures may be tightened in response to terrorism, which raises transportation costs and constrains trade. Terrorism may also create anxiety and influence risk percep-

[6] The channels of transmission from terrorism to reduced economic activity are also discussed in, e.g., Sandler and Enders (2008). See also Eckstein and Tsiddon (2004) for an example of a theoretical model of related linkages. Finally, the various transmission channels are also discussed in the introduction to this thesis and in Chapter 3.

tions. Changes in the perception of security may impact, inter alia, public investment (which may be redirected to security measures), savings and investment decisions (e.g., leading to the flight of capital to other countries), and the patterns of economic activity in susceptible sectors (e.g., tourism).

While there are no empirical studies that relate terrorism to reduced economic activity in Latin America, anecdotal evidence indicates that terrorist organizations indeed use violence to cause economic destabilization. For instance, in 2007 the Mexican *Ejército Popular Revolucionario* (*EPR*) attacked pipelines in Mexico which led to the closure of factories, fuel shortages and economic losses amounting to hundreds of millions of dollars (Los Angeles Times, 2007). Similarly, it is plausible that terrorist activity in Latin America between 1970 and 2007 was harmful to, e.g., trade and the region's attractiveness to foreign capital, thereby damaging economic growth and development. This expectation is in line with a number of empirical studies which find that terrorism indeed generates economic damage through its negative effect on trade (e.g., Nitsch and Schumacher, 2004), tourism (e.g., Llorca-Vivero, 2008), foreign direct investment (e.g., Enders and Sandler, 1996), and on further important economic variables such as technological innovation and migration (e.g., Larocque et al., 2010; Dreher et al., 2011). Expecting a substantial negative effect of terrorism on growth for Latin America is also in line with previous studies that show the adverse effect of terrorism on economic growth (e.g., Abadie and Gardeazabal, 2003; Eckstein and Tsiddon, 2004; Crain and Crain, 2006; Araz-Takay et al., 2009).

However, we may also hypothesize that terrorism did not automatically feed through to reduced economic performance in Latin America during our period of observation. Rather, causality from terrorism to the economy may have followed—as with the opposite direction of causation—a *heterogeneous pattern*. This view results from the findings of several studies that are rather more skeptical about the impact of terrorism on the economy. For instance, some studies find that the effects of terrorism on foreign direct investment (Enders et al., 2006) and economic performance (e.g., Tavares, 2004; Gaibulloev and Sandler, 2009, 2011; Gries et al., 2011) are rather small. As noted by Sandler and Enders (2008), the causal

effect of terrorism on economic performance may depend on certain country-specific traits. First, terrorist attacks are anticipated to have only localized effects. For instance, attacks may only hurt the tourism industry in a certain part of a country. Second, in particular when countries are diversified, a shift in economic activity away from vulnerable to more robust sectors within an economy is likely to occur (coupled with quick adjustments in the allocation of resources), e.g., as businesses adapt to terrorism by decentralizing (Frey, 2009). Such efficient behavior by markets and agents is anticipated to further mitigate negative effects of terrorism on economic growth. Third, the costs of terrorism also need to be weighed against the size of a country's economy, where terrorism is less likely to lead to noticeable damage with increasing size. For instance, Gaibulloev and Sandler (2009) find that terrorism is not detrimental to growth in advanced Asian economies, implying that higher levels of economic development and size lower the vulnerability to economic damage from terrorism. In fact, even the high costs of the 9/11 attacks (in absolute terms) can be considered small when seen in relation to the economic size of the U.S. (Sandler and Enders, 2008).

Given the Latin American history of terrorism, heterogeneous causation from terrorism to growth seems intuitive. First, some countries in Latin America were hardly hit by terrorism between 1970 and 2007, so that noticeable economic damage on an aggregate level from such low-scale terrorist activity seems implausible. Second, terrorist activity was at times limited to inaccessible parts of a country that did not matter strongly to a country's economic performance. Third, some countries in Latin America (e.g., Chile, Argentina) were—as already discussed above—rather advanced in terms of institutional and state capacity and thereby potentially able to cushion the negative repercussions from terrorism by means of, e.g., interventionist government policies. Similarly, higher levels of development also ought to coincide with more efficient behavior on the part of private economic agents in the face of terrorism, further mitigating the negative effects from terrorism (e.g., decentralization, reallocation of economic resources, substitution, diversification). Fourth, a number of countries in Latin America had a large economy during our period of obser-

vation, making it less likely even for strong terrorist activity to feed through to reduced (national) economic performance. Following Sandler and Enders (2008) and in line with Gaibulloev and Sandler (2009), a heterogeneous causal pattern from terrorism to economic growth thus seems plausible for Latin America. Here, the small and less advanced countries (e.g., Ecuador, Guatemala, Bolivia) can be anticipated to have been especially likely to experience macroeconomic consequences due to terrorism, particularly when terrorist activity was persistent and intense.

4.2.3 Summary of Potential Causal Linkages

Our literature review has shown that causality between terrorism and economic growth in Latin America between 1970 and 2007 may have run (i) unidirectionally from economic growth to terrorism, (ii) unidirectionally from terrorism to growth, or (iii) in both directions simultaneously (bidirectional causality). Independent of the exact direction of causality, it may have been present (iv) for all Latin American countries (homogeneous causality) or (v) only for some countries (heterogeneous causality), where the latter view also takes into account more skeptical contributions on the terrorism-economy nexus. Finally, (vi) following a very skeptical view the linkages between terrorism and growth may have not mattered to any country, so that other factors determined the patterns of terrorism and economic activity instead. In the following empirical part of this contribution we examine which hypotheses regarding the causal relationship between terrorism and economic growth suit the Latin American experience best. Here, we focus on Latin America due to its interesting history of economic growth and terrorist activity, the ideological alignment of many terrorist groups in this part of the world that ought to make them particularly responsive to economic changes, and the lack of statistical studies on the causes and consequences of Latin American terrorism.

4.3 Data and Variables

4.3.1 Economic Growth Data

When analyzing the terrorism-economy nexus for Latin America, we use the *growth rate of real gross domestic product per capita* (*GDP*) to indicate a country's economic situation. As shown by, e.g., Blomberg et al. (2004b), times of economic contraction (slow or negative economic growth) indicate unfavorable economic conditions that are assumed to coincide with more terrorism. Times of economic expansion (strong economic growth) ought to be associated with reduced terrorism as economic conditions are more favorable, so that, e.g., non-violent (economic) opportunities open up and the opportunity costs of violence increase. The data is drawn from the *PENN World Table* (Heston et al., 2009).

4.3.2 Terrorism Data

We employ three indicators of terrorist activity and adjust all of them for population size. We correct for country size because we expect the average effect of terrorism on the economy to decline with it, while larger countries are also anticipated to experience more terrorist activity in absolute numbers (cf. Sandler and Enders, 2008; Krieger and Meierrieks, 2011). Using three terrorism indicators also adds to the robustness of our findings, in particular as no existing indicator is able to measure terrorism as a whole (e.g., with respect to its level or its repercussions). First, we use the *number of terrorist attacks per 100,000 inhabitants* (*TA*). Second, we employ the *number of terrorism victims per 100,000 inhabitants* (*TV*), i.e., the number of individuals wounded or killed in terrorist strikes. Previous studies on the causes and consequences of terrorism also use similar indicators (e.g., Tavares, 2004; Crain and Crain, 2006; Gaibulloev and Sandler, 2011). While the former indicates the frequency of terrorism, the latter indicates its intensity. Third, we construct a *terrorism index* (*TI*) similar to that employed by Eckstein and Tsiddon (2004), which includes information on

the number of terrorist attacks and terrorism victims in a given year and country.[7] The data for population size is drawn from the PENN World Table. The raw data for the terrorism variables is drawn from the *Global Terrorism Database* (*GTD*) (LaFree and Dugan 2007).

The GTD, unlike other databases, includes data on domestic and transnational terrorism. Even though domestic terrorism is far more common than transnational terrorism, previous empirical studies have resorted to an analysis of the causes and consequences of the latter due to data constraints (e.g., Krieger and Meierrieks, 2011). However, transnational terrorism is expected to be associated with international political factors (i.e., foreign policy). For instance, Addison and Murshed (2005) argue that transnational terrorism may be used by a terrorist group against the external sponsor of a domestic government the group opposes, so as to reduce the political support of this sponsor for the domestic government. Similarly, the evidence provided by, e.g., Savun and Phillips (2009) and Azam and Thelen (2010) indicates that international political variables (e.g., military interventions, involvement in international crises) matter to the patterns of transnational terrorism. However, such variables are less likely to matter to domestic terrorism, which is usually more strongly related to domestic goals and circumstances. Therefore, one may argue that domestic terrorism can be expected to share a closer association with a country's economic situation than transnational terrorism.

For our analysis we consider *all terrorist activity* (i.e., domestic and transnational terrorism) in a given country and year in order to examine the terrorism-economy nexus in Latin America. That is, we take into account terrorism by domestic groups against domestic and foreign targets, terrorism by foreign groups (i.e., imported transnational terrorism) and unclaimed terrorist activity.[8] Therefore, we are able to consider the aggregate effect of

[7] Formally, the terrorism index TI is equal to: $TI = \ln(e + TA + TV)$, where e is the mathematical constant and TA and TV are the number of terrorist attacks per 100,000 inhabitants and the number of terrorism victims per 100,000 inhabitants, respectively. The index thus captures the frequency as well as the intensity of terrorism.

[8] While most of the recorded activity in Latin America was carried out by domestic groups against domestic and international targets (ca. 65% of all activity) and little of the activity can be considered imported transnational terrorism (ca. 4%), a considerable measure of activity (ca. 30%) cannot be attributed to a specific terrorist group.

terrorism on the economy (and vice versa). Terrorist activity is expected to produce economic damage, regardless of the origin of the attacking terrorists, so that we see no point in differentiating between domestic and transnational terrorism.[9] Also, national economic conditions ought to matter to domestic and foreign groups alike. As an example, while slow growth may make it easier for domestic terrorist groups to recruit new members (so that domestic terrorism increases), foreign groups may also find it attractive to attack so as to further destabilize the domestic economy (so that imported transnational terrorism also increases).

4.4 Panel Causality Analysis: Methodology and Findings

In this section we introduce the methodology to test for causality in a panel framework and discuss our findings. We first examine the stationarity properties of the terrorism and growth data series by means of a series of *panel unit root tests*. We then test for *Granger causality* (Granger, 1969) with panel data, treating the data correctly as it follows from the results of the panel unit root tests. Finally, we follow Hurlin and Venet (2001) and Hurlin (2005) and use a sequential approach to test for causality that allows us to treat all variables as endogenous. Here, we first assess whether the independent variable (say, x) Granger-causes the dependent variable (say, y) in any cross-section. Rejection of the null hypothesis of *non-causality* takes us to the second step, where we test for *homogeneous causality*. That is, we examine whether x uniformly Granger-causes y in all cross-sections. If we reject the null hypothesis of homogeneous causality, we in a third step may assess for which group of cross-sections x Granger-causes y (*group-specific causality*).

This sequential approach with panel data has several advantages. First, through the use of time-series cross-sectional data we are able to use more observations and reduce iden-

[9] The relationship between terrorism and economic growth may depend on the type of terrorism, as suggested by Gaibulloev and Sandler (2011). While we argue in favor of using data on total terrorist activity to examine this relationship, future research may evaluate the isolated effects of domestic and transnational terrorism on growth (and vice versa). The potentially different effects of domestic and transnational terrorism on economic activity are also discussed in the introduction to this doctoral thesis.

tification problems, thus arriving at more efficient results than conventional time-series causality analyses. Second, we are able to take into account *country-specific* (*fixed*) *effects* which are likely to matter in our analysis. For instance, (virtually) time-invariant factors such as geography and national mentality that are captured in the fixed effects may influence economic performance and terrorist activity, so that accounting for them ought to help to identify the terrorism-economy nexus more closely. Third, we allow for *causal variation* among the countries. By pursuing this approach—described below in more detail—we relax the strong assumption that the causal effect of the respective independent on the respective dependent variable is identical across all cross-sections.[10]

4.4.1 Unit Root Tests

In order to correctly test for Granger causality, all considered series need to be stationary (cf. Granger, 1969). Thus, we begin our analysis by investigating the stationarity properties of the data series. Here, we employ several panel unit root tests which generally test the null hypothesis of a (non-stationary) *I(d)* unit root process against the alternative hypothesis that no unit root is present, so the series are stationary, i.e., *I(0)*. The results have implications for the transformation of the data. First-differencing may be necessary to generate *I(0)* series. Also, when series are integrated of the same order they may share a long-run relationship (*cointegration*) which needs to be accounted for by means of an error correction model.

The results of the panel unit toot tests are reported in Table 4.1. Regardless of which panel unit root test we use, we find that all series are stationary. Thus there is no need to transform the series. Also, there is no need to investigate potential cointegrating relationships between the data series, given that they are all *I(0)*.

[10] As discussed above, causality in the terrorism-economy nexus may be heterogeneous. For example, terrorism may strongly affect the economy in less diversified countries, yet may not matter to more developed countries. Through our approach we are able to detect such causal heterogeneity. By contrast, a priori assuming *causal homogeneity* may lead to incorrect causality inferences.

Variable	LLC test	Breitung t-stat	IPS test	Fisher χ^2 (ADF)	Fisher χ^2 (PP)
Economic Growth (G)	-11.59***	-9.21***	-10.59***	172.44***	169.67***
Terrorist Attacks (TA)	-10.81***	-5.83***	-9.21***	348.63***	309.82***
Terrorism Victims (TV)	-9.46***	-8.37***	-8.61***	147.69***	191.60***
Terrorism Index (TI)	-4.34***	-5.02***	-5.25***	101.21***	195.92***

Notes: LLC = Levin-Liu-Chu test. IPS = Im-Pesaran-Shin test. Individual effects and linear trends included as exogenous variables. Automatic lag length selection through Schwarz Information Criterion (SIC/BIC). Probailities for Fisher tests computed using an asymptotic χ^2 distribution, while all other tests assume asymptotic normality. $^{***}p < 0.01$ (indicating rejection of null hypothesis, i.e., a unit root process).

Table 4.1: Panel Unit Root Test Results

4.4.2 Test for Panel Non-Causality

Methodology

After having identified the stationarity properties of the data series, we can begin to test for panel causality, following Hurlin and Venet (2001) and Hurlin (2005). Here, we consider the following model:

$$y_{ie,t} = \sum_{k=1}^{p} \gamma_i^{(k)} y_{ie,t-k} + \sum_{k=1}^{p} \beta_j^{(k)} x_{i,t-k} + \alpha_i + v_{i,t}, \tag{4.1}$$

where y is our e-th measure of terrorism (TA, TV, TI) of cross-section i in period t. It is explained by past values of y, with lags running from 1 to p, where we work with a maximal lag length of p=3. It is also explained by past (i.e., lagged) values of economic growth (x) and the country-fixed effects α. v is the error term. In order to allow for a maximum of causal heterogeneity, the autoregressive coefficients ($\gamma_i^{(k)}$) and the regression coefficients ($\beta_i^{(k)}$) are allowed to vary across cross-sections i. However, they are assumed constant for all lags running from 1 to p, so as to retain sufficient degrees of freedom.[11]

[11] The constant is always excluded. Estimating the causal effect of terrorism on growth requires us to consider a model where economic growth (x) is the dependent variable. We estimate all subsequent models using the least square dummy variable ($LSDV$) estimator. Estimating models that include a lagged dependent variable may bias the estimation results (dynamic panel bias). However, Judson and Owen

We first test for panel non-causality. Here, we compute the sum of squared residuals (RSS_2) from a model that only includes information on the lagged dependent variable and the fixed effects to estimate present values of the dependent variable. That is, we do not include information on x in Equation (4.1). Then we compute the sum of squared residuals (RSS_1) from a model that also includes the lagged independent variable (so that we now estimate the model specified in Equation (4.1)). We use the following test statistic (F_1) to assess whether the inclusion of the lagged independent variable increases the explanatory power of our model:

$$F_1 = \frac{(RSS_2 - RSS_1)/(Np)}{RSS_1/[NT - N(1+p) - p]}, \tag{4.2}$$

where N is the number of cross-sections, T is the number of time periods and p is the number of lags. Here, the null hypothesis is that the independent variable does not Granger-cause the dependent variable for any cross-section. Using an F-distribution with *Np*, *NT-N(1+p)-p*, *df* (Hurlin and Venet, 2001), we can assess whether the null hypothesis of non-causality is rejected (significant F_1-statistic) or not (insignificant F_1-statistic). In the latter case, we find that the independent variable does not cause the dependent variable for any cross-section, so the test ends here.

4.4.3 Findings

Following the causality testing sequence described above, we test for non-causality from growth to terrorism and vice versa. The results are reported in Table 4.2.

The findings indicate that terrorism *does not Granger-cause economic growth*, regardless of which indicator of terrorism we use and which lag length we employ. This finding is consistent with skeptical views regarding the effect of terrorism on the economy (e.g.,

(1999) show that this bias becomes smaller with a larger T (time dimension). Given that *T=38* for our sample, we follow Judson and Owen (1999) and argue that the LSDV estimator is suited to our dynamic panel estimations.

Lags	F_1 Test Statistics
Economic growth Granger-causes terrorist attacks	
t-1	6.3442***
t-2	1.9925***
t-3	1.2604*
Terrorist attacks Granger-cause economic growth	
t-1	0.7192
t-2	0.6450
t-3	0.4226
Economic growth Granger-causes terrorism victims	
t-1	2.6418***
t-2	1.0170
t-3	2.3056***
Terrorism victims Granger-cause economic growth	
t-1	1.2481
t-2	0.3743
t-3	0.8237
Economic growth Granger-causes terrorism index	
t-1	4.3560***
t-2	2.3001***
t-3	1.9003***
Terrorism index Granger-causes economic growth	
t-1	1.2304
t-2	0.5909
t-3	0.4059

Notes: Critical values for F_1 based on F-distribution with *Np, NT-N(1+p)-p*, df (Hurlin and Venet, 2001). $^{*}p < 0.10$; $^{***}p < 0.01$ (indicating rejection of null hypothesis, i.e., non-causality).

Table 4.2: Test for Panel Non-Causality

Sandler and Enders, 2008; Gaibulloev and Sandler, 2009). While our evidence does not imply that terrorist activity did not impede economic growth on sub-national levels (e.g., in Chiapas in Mexico) or damaged certain sectors that are vulnerable to terrorism (e.g., the tourism industry), neither does it indicate that such effects fed through to overall economic performance. It is possible that the attacked economies in Latin America were large enough in terms of economic size and diversified enough to absorb terror-induced shocks on, e.g., investment, tourism and trade, so that overall growth was not impaired. For instance, the relatively high level of development of Chile—meaning efficient behavior by public and private economic agents (e.g., sound policies to counter terrorism, effective reallocation of economic resources)—seems to have rendered even powerful armed campaigns by, e.g., the *MIR*, the *FPMR* and the *Movimiento de Acción Popular Unitaria* (*MAPU*) ineffective in terms of destabilizing the economy.[12] Alternatively, we can argue that terrorism in Latin America was more of a peripheral phenomenon (i.e., often restricted to the hinterland) or simply not severe (i.e., organized and/or persistent) enough to induce observable economic damage. Since we do not find an effect of terrorism on growth, there is no need to further analyze this direction of causality.

With respect to the causal effect of economic growth on terrorism, we reject the null hypothesis of non-causality in almost all cases, regardless of which indicator of terrorist activity and lag length we employ.[13] That is, at least for some Latin American countries economic growth causally influenced terrorism. Previous economic success may have made it less attractive to engage in terrorism, meaning that would-be terrorists and their supporters would lose more than they would gain from using violence. Also, terrorists and their supporters may have had more non-violent opportunities to participate economically during economic upturns. By the same token, times of economic downswings may have meant that terrorist organizations were more able to capitalize on economic grievances

[12] For the period of 1970 to 2007 the GTD reports over 300 terrorist attacks by the *MIR*, over 800 attacks by the *FPMR* and over 100 attacks by the *MAPU*.

[13] Our analysis indicates that the second lag of economic growth does not Granger-cause TV. We therefore do not consider this specific lag in the subsequent analysis.

when striving for popular support and recruits. However, the findings presented in Table 4.2 do not automatically mean that causality from growth to terrorism is homogeneous. In fact, more skeptical views regarding this direction of causality may yet be vindicated in the remainder of our analysis.

4.4.4 Test for Homogeneous Panel Causality

Methodology

Having rejected the null hypothesis of non-causality for the effect of growth on terrorism, we proceed to test for homogeneous causality. Previously, we allowed for causal heterogeneity among cross-sections. However, a stronger assumption is to presuppose a common causal link from the independent to the dependent variable that is present for all cross-sections. To assess whether homogeneous causality is indeed present, we use RSS_1 (as calculated above) and the residual sum of squares (RSS_3) from a model where the slope terms of the independent variable are constrained to be equal across all cross-sections, thus not allowing for causal variation. That is,$\beta_i^{(k)}$ from Equation (4.1) is now specified to be not only equal across different lag lengths but also across cross-sections. We then calculate the new test statistics (F_2) from:

$$F_2 = \frac{(RSS_3 - RSS_1)/[p(N-1)]}{RSS_1/[NT - N(1+p) - p]}, \tag{4.3}$$

Here, the null hypothesis is that the independent variable Granger-causes the dependent variable for all cross-sections. Using the same F-distribution as before, a rejection of the null hypothesis (significant statistic) suggests that the independent variable does not Granger-cause the dependent variable at least for one cross-section, so that our original assumption of causal heterogeneity was valid. An insignificant test statistic tells us that homogeneous causality is indeed present.

Lags	F_2 Test Statistics
Economic growth Granger-causes terrorist attacks	
t-1	6.3241***
t-2	2.1076***
t-3	1.2754*
Economic growth Granger-causes terrorism victims	
t-1	2.6216***
t-2	—
t-3	2.2099***
Economic growth Granger-causes terrorism index	
t-1	4.0592***
t-2	2.3207***
t-3	1.9155***

Notes: Critical values for F_2 based on F-distribution with *Np, NT-N(1+p)-p*, df (Hurlin and Venet, 2001). $^{*}p < 0.10$; $^{***}p < 0.01$ (indicating rejection of null hypothesis, i.e., homogeneous causality).

Table 4.3: Test for Homogeneous Panel Causality

Findings

The empirical findings are reported in Table 4.3. In short, the test results indicate that there is *no common causal process* from growth to terrorism for all countries in our sample (regardless of which terrorism indicator and lag length we use). Given that some countries in Latin America were hardly hit by terrorism between 1970 and 2007 (e.g., Costa Rica), this finding is not too surprising.

4.4.5 Testing for Group-Specific Panel Causality

Methodology

So far, our analysis has shown that economic growth Granger-causes terrorist activity, but not for all Latin American countries. Now we want to analyze for which countries growth matters to terrorism. We divide our country sample into two groups, where one group accounts for the *lower middle income* (*LMI*) countries and the other for the *upper middle income* (*UMI*) countries. As noted above, we expect the causal heterogeneity to depend

on a country's level of development, where less developed economies are anticipated to be more prone to economic change than more developed countries.[14] We argued that in less developed economies a comparatively stronger need for socio-economic progress is likely, so that higher importance ought to be attached to economic variables when, e.g., support for a terrorist organization is considered. Also, given that the level of economic development usually correlates with a country's level of institutional and state capacity, economic factors ought to matter more strongly to less developed countries. For instance, countries with a low level of institutional capacity can be expected to be more vulnerable to economic shocks as they are less likely to provide efficient means of socio-economic participation (e.g., social welfare systems, education) to reduce related grievances or to introduce sound economic policies to counter recessions.

We test for group-specific causality by calculating the residual sum of squares ($RSS_{2,j}$) from a model which uses information on the lagged dependent variable, the fixed effects and the lagged independent variable with the exception of the slope coefficient of the cross-sections of interest (i.e., a subset of panel members) j to estimate present values of the dependent variable. With respect to Equation (4.1), this means to calculate this model but to constrain the slope coefficients of sub-sample j to 0 (i.e., $\beta_i^{(k)} = 0$). Using RSS_1 (as calculated above), we compute our third F-statistic (F_3) from:

$$F_3 = \frac{(RSS_{2,,j} - RSS_1)/(n_{nc}p)}{RSS_1/[NT - N(1+p) - n_c p]}, \tag{4.4}$$

where n_{nc} is the number of panel members for which the slope coefficient is constrained to 0 and n_c is the number of panel members for which this is not the case. For this part of the analysis the null hypothesis is that the independent variable does not cause the dependent

[14] We follow the most recent income classification provided by the *World Bank*. The LMI countries in our sample are Bolivia, Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, and Paraguay. The UMI countries in our sample are Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Panama, Peru, Uruguay, and Venezuela.

variable for subset j. Using the same F-distribution as above, we can assess whether the exclusion of the slope terms of the subset j (indicating either the LMI or UMI countries) influences the explanatory power of the model. If the F_3-statistic is significant, the null hypothesis of non-causality for the respective subset j is rejected. That is, the model loses explanatory power with the exclusion of j, indicating that for this subset the independent variable Granger-causes the dependent variable. If the F_3-statistic is insignificant, it means that the exclusion of the respective slope terms does not affect the model's explanatory power, so that for the respective subset the independent variable does not Granger-cause the dependent variable.

Findings

The findings of the group-specific tests for non-causality are reported in Table 4.4. In short, the results indicate that economic expansions and contractions swayed terrorist activity only in the LMI but not in the UMI countries. This is consistent with our expectation that economic variables only mattered to terrorism in the less developed countries in our sample.

For the less developed countries in our sample there is evidence that growth influenced the genesis of terrorism. By comparison, the LMI experienced less economic success and stronger economic fluctuations.[15] At the same time, they dedicated fewer resources to policy means that would have ameliorated grievances associated with poor economic conditions and performance.[16] The comparatively poorer economic performance and institutional framework of the LMI countries makes it plausible that (potential) terrorists and their supporters in these countries were more strongly motivated by socio-economic causes, which also relates to the ostensible goals (redistribution) and ideological motiva-

[15] While the average growth rate in the LMI countries is 0.91%, it is 1.91% in the UMI countries. The standard deviation of economic growth in the LMI countries is 5.46, but only 4.77 in the UMI countries.

[16] For instance, between 1980 and 1999 the LMI countries spent only 1.18% of GDP on social security, whereas the UMI countries spent 4.64% of GDP during the same period. See the *United Nations Economic Commission for Latin America and the Caribbean website* (http://www.eclac.cl/publicaciones) for the corresponding data.

Lags	F_3 Test Statistics
Economic growth Granger-causes terrorist attacks for *LMI* countries	
t-1	15.399***
t-2	4.5154***
t-3	2.6988***
Economic growth Granger-causes terrorist attacks for *UMI* countries	
t-1	0.3866
t-2	0.2808
t-3	0.1134
Economic growth Granger-causes terrorism victims for *LMI* countries	
t-1	6.300***
t-2	—
t-3	5.5938***
Economic growth Granger-causes terrorism victims for *UMI* countries	
t-1	0.3855
t-2	—
t-3	0.0144
Economic growth Granger-causes terrorism index for *LMI* countries	
t-1	10.465***
t-2	5.3142***
t-3	4.5124***
Economic growth Granger-causes terrorism index for *UMI* countries	
t-1	0.3637
t-2	0.2584
t-3	0.1373

Notes: *LMI* = lower middle income; *UMI* = upper middle income. Classification according to the World Bank. Critical values for F_3 based on F-distribution with *Np, NT-N(1+p)-p*, df (Hurlin and Venet, 2001). $^{***}p < 0.01$ (indicating rejection of null hypothesis, i.e., non-causality).

Table 4.4: Test for Group-Specific Non-Causality

tions of many terrorist groups operating in these countries. As in Blomberg et al. (2004a, b), economic marginalization may have provided incentives to resort to violence. The eventual economic success of the LMI countries (even though it was slow to arrive) might have ultimately coincided with higher opportunity costs of violence that impeded terrorism recruitment and caused popular support for terrorism to dwindle. For the LMI countries, we thus concur with other empirical studies that attribute a noticeable role to economic factors in determining terrorism.

However, the group-specific causality analysis also offers support for skeptical views towards the terrorism-economy nexus. For the UMI countries we detect no evidence of an effect of growth on terrorism. Compared to the LMI countries, a higher initial level of development, stronger economic performance between 1970 and 2007 and a sounder institutional framework that may have been able to better cushion economic marginalization and crisis may explain why economic performance did not matter strongly to terrorism for this group of countries. Evidently, other (non-economic) factors – which we will discuss below – were more important for the calculus of terrorists in the UMI countries, so that economic growth (or policies that augmented it) did not help to reduce terrorism. For the UMI countries, our results are in line with those empirical studies that consider economic variables to play only a minor role in terrorism.

4.5 Negative Binomial Analysis

Our panel causality analysis findings suggest that causality running from economic performance to terrorism in Latin America follows a heterogeneous pattern, where growth influenced the patterns of terrorism in the less developed (LMI) but not in the higher developed (UMI) Latin American countries. Reverse causation was not detected. Given that we analyzed the question of terrorism-economy causality in bivariate systems, the omission of relevant variables mattering to the emergence of terrorism may be an issue. Such an omission may bias Granger causality inferences. However, a multivariate approach to testing for panel causality within our methodological framework has yet to be developed.

We therefore use an alternative empirical approach to further examine our findings. We investigate the effect of economic performance on terrorism using count data models, so that we are able to assess whether our findings regarding an effect of growth on terrorism are robust to the inclusion of further controls. At the same time, we are able to examine which other factors determined terrorism in Latin America, particularly with respect to the UMI countries. Finally, treating the terrorism data as event-count data—instead of adjusting it for population and treating it as continuous, as we did in the causality analysis—ought to add to the robustness of our empirical findings.

4.5.1 Methodology

We estimate a series of *negative binomial* (*maximum-likelihood*) *regression models* because our dependent variable (the number of terrorist attacks) is discrete, assumes only non-negative values and has a variance that is larger than its mean (overdispersion).[17] This is the standard empirical model when assessing the determinants of terrorism using event-count data. All independent variables enter the estimation model in the lagged *(t-1)* form, so as to avoid reverse causation. In some specifications we also include year dummies to take into account the omission of relevant variables as well as unit effects and trending effects commonly associated with terrorism.

4.5.2 Data and Variables

We use the total number of terrorist attacks as our dependent variable, where the data is extracted from the GTD. As before, we use the growth rate of real GDP per capita as our main independent variable of interest, with the data coming from the PENN World Table. Here, we construct two variables by interacting the growth series with dummy variables reflecting whether a country is a LMI or UMI country, so that we are able to account for the group-specific causal effects of growth on terrorism that were detected in

[17] Note that this estimation procedure has already been described in more detail in Chapter 2 of this doctoral thesis. The related discussion is not reiterated here.

Variable	N*T	Mean	Std. Dev.	Min.	Max.
No. of Terrorist Attacks	684	40.16	108.60	0	711
Economic Growth	684	1.52	5.07	-41.10	35.91
Population Size	684	4.00	0.51	3.18	5.29
Real GDP Per Capita	684	8.68	0.47	7.48	9.82
Democracy	684	6.83	3.14	0.50	10
Regime Stability	684	0.96	0.49	0	1.95
Trade Openness	684	57.52	39.42	10.32	222.89
Cold War Era	684	0.61	0.49	0	1
Guerilla Warfare	684	0.33	0.78	0	8
Military Spending Per Capita	682	3.21	0.89	0.64	5.76

Table 4.5: Summary Statistics for Negative Binomial Regressions

the panel causality analysis. We also introduce a number of controls, where we build on the rich literature on the determinants of terrorism. The summary statistics of the dependent variable and the controls are reported in Table 4.5.

First, we control for (logged) *population size* since it is often found to be positively correlated with terrorism (Krieger and Meierrieks, 2011). For instance, a larger population may reflect higher policing costs or a higher degree of demographic stress. Also, larger countries are more likely to suffer larger absolute numbers of terrorist attacks, so controlling for population size should take into account any scale bias. Data on population size is extracted from the PENN World Table.

We control for the *level of economic development* in a country by including data on (logged) real GDP per capita from the PENN World Table. In line with our previous argumentation a higher level of development ought to reflect fewer economic grievances that may otherwise lead to terrorism (e.g., Lai, 2007).

The level of *democracy* may also matter, given that many terrorist groups in Latin America styled themselves as fighting against repressive (non-democratic) regimes (e.g., Feldmann and Perälä, 2004). Being able to participate politically with relative ease then ought to make it less attractive to make one's voice heard through violence, implying a negative relationship between terrorism and democracy (e.g., Li, 2005). However, political repression and military actions against terrorist groups are less likely when governments

have to respect civil liberties and account for a broad range of political interests, potentially suggesting a positive link between terrorism and democracy (e.g., Li, 2005).[18] For instance, Peru's President Fujimori argued that democratic constraints had given rise to terrorist movements (e.g., the *Sendero Luminiso*, *SL*, and the *Movimiento Revolucionario Túpac Amaru*, *MRTA*) when staging an anti-democratic coup, so as to impose a (non-democratic) means of repression to fight these movements. Controlling for the level of democracy also helps to account for a reporting bias in terrorism (e.g., Li, 2005; Drakos and Gofas, 2006). In countries that have a low level of political development the press is likely to be controlled, so that the coverage of terrorism is expected to be restricted. Then, the actual number of terrorist incidents in such countries is likely to differ from the number of incidents reported and subsequently recorded in terrorism databases (e.g., the GTD data).[19] The presence of this reporting bias may also explain any positive relationship between terrorism and democracy. We use the unified polity score (polity2) from the *PolityIV Project* (Marshall and Jaggers, 2008), where we rescale this index so that it only takes positive values, with higher values meaning a higher level of political openness.

Following Piazza (2008), we also control for the effect of political instability on terrorism. We expect *regime stability* to be negatively related to terrorism, as unstable regimes may produce political vacuums that terrorist groups can use to forward their agenda. Some countries (e.g., Argentina and Chile) experienced regime changes, which may have led to terrorist activity associated with them. For instance, the activity by left-wing (e.g., the *ERP*) and right-wing (e.g., the *AAA*) groups in Argentina can be seen in the context of the military coup in Argentina in 1976. Regime stability is measured as the (logged plus unity) number of years since the most recent regime change, with the data coming from the PolityIV Project.

[18] This may imply that semi-open polities are most vulnerable to terrorism, as suggested by, e.g., Kurrild-Klitgaard et al. (2006). We run a non-linear specification of our estimation model to account for this.

[19] As in Drakos and Gofas (2006), we run a zero-inflated negative binomial regression (*ZINB*) model to take the under-reporting bias of non-democracies into account. Here, we use the level of democracy (that closely correlates with the freedom of the press) as a determinant for zero inflation, i.e., for the case that terrorism is never reported.

We also control for *trade openness*. As Krieger and Meierrieks (2011) note, a country's degree of economic integration may, e.g., induce resentment towards globalization, making it easier for terrorist groups to recruit. Alternatively, e.g., when economic integration leads to economic gains it may be associated with less terrorism since it removes some of the socio-economic causes of terrorism. Trade openness is measured by the trade ratio (exports and imports to real GDP) extracted from the PENN World Table.

We also run regressions where we include a variable indicating the *Cold War era*. As noted above, during the Cold War time many Latin American terrorist groups gained the support of one of the two superpowers (Gorriti, 1991). After the end of the Cold War such support is likely to have been withdrawn, meaning that terrorist groups may have found it difficult to sustain their Cold War level of activity. We thus expect a positive relationship between the Cold War era and terrorist activity. The Cold War era is operationalized by a dummy variable (1 if $T \leq 1992$).

Finally, we take into account the results of Gassebner and Luechinger (2011) who find that guerrilla warfare and military spending are among the robust correlates of terrorism. *Guerrilla warfare* as another form of political violence ought to be positively related to terrorism, given that insurgents often resort to terrorism as part of a violent campaign to overthrow a government. As in Gassebner and Luechinger (2011), it is measured by the level of guerrilla activity, with the data coming from the *Cross-National Time-Series Data Archive* (Databanks International, 2009). *Military spending* ought to be positively related to terrorism due to the asymmetries between terrorist organizations and opposing governments. Here, the weaker belligerent is anticipated to resort to terrorism as the most cost-efficient mode of violence (Gassebner and Luechinger, 2011). Military spending is measured in (logged plus unity) per capita terms with data from the *National Material Capabilities Dataset* (e.g., Singer, 1987).

4.5.3 Empirical Results

Main Findings

The empirical results from the series of negative binomial regressions are reported in Table 4.6. In short, they offer further support for our panel causality analysis findings, as they suggest that favorable economic conditions reduced terrorist activity in the less developed countries in our sample, but did not matter to the higher developed ones.

For all specifications we find that economic growth exerts a negative and statistically significant influence on terrorist activity in the LMI countries in our sample. However, while the effect of growth on terrorism is also negative and statistically significant for the UMI countries in a simple specification (Model 2), this effect vanishes once we also consider additional controls. Using count data, we thus find support for the view that poor economic conditions have been conducive to terrorism in the LMI countries in our sample, e.g., by driving up economic marginalization and lowering the opportunity costs of terrorism. However, factors other than economic performance seem to have driven terrorism in the UMI countries of Latin America. This finding adds to the evidence from the panel causality analysis, which similarly implied a substantial causal link from growth to terrorism only for the LMI countries. These findings are robust to the inclusion of a set of socio-economic, political, military and demographic controls.

With respect to the controls, our findings suggest that a variety of socio-economic, political, military and demographic factors also influenced the calculus of terrorists in Latin America. The findings are generally in line with previous contributions concerned with the causes of terrorism in Latin America (e.g., Lopez, 1988; Feldmann and Perälä, 2004) and also broadly echo the empirical mainstream with respect to the determinants of terrorism (e.g., Gassebner and Luechinger, 2011; Kis-Katos et al., 2011; Krieger and Meierrieks, 2011).

First, we find that terrorist activity is positively correlated with population size. While this finding may reflect the fact that larger countries are more likely to experience a larger

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Growth	-0.062								
	(3.72)***								
Growth*LMI		-0.059	-0.036	-0.032	-0.049	-0.029	-0.049	-0.051	-0.032
		(2.89)***	(2.01)*	(1.90)*	(2.71)***	(1.64)*	(2.33)**	(2.44)**	(1.94)*
Growth*UMI		-0.066	-0.018	0.004	-0.012	-0.022	-0.014	-0.013	0.004
		(2.38)**	(0.95)	(0.22)	(0.59)	(0.94)	(0.69)	(0.62)	(0.24)
Population Size			2.573	1.798	1.966	1.353	1.793	1.374	1.742
			(11.76)***	(6.71)***	(6.66)***	(4.85)***	(7.05)***	(4.64)***	(6.34)***
Real GDP p.c.			-0.823	-0.730	-1.517	-0.682	-2.174	-0.689	-0.718
			(4.23)***	(3.74)***	(6.53)***	(2.63)***	(8.64)***	(2.66)***	(3.69)***
Democracy			0.003	-0.002	0.003	0.030	-0.002	1.242	-0.013
			(0.09)	(0.07)	(0.08)	(0.85)	(0.06)	(5.18)***	(0.40)
Regime Stability				-0.079	-0.456	-0.538	-0.228	0.101	-0.050
				(0.55)	(2.79)***	(3.38)***	(1.39)	(0.51)	(0.34)
Trade Openness				-0.014	-0.010	-0.006	-0.009	-0.011	-0.014
				(6.22)***	(3.37)***	(2.18)**	(3.16)***	(3.49)***	(6.24)***
Cold War Era					1.504	1.473	1.797	1.753	
					(6.86)***	(7.81)***	(7.54)***	(7.97)***	
Guerilla Warfare						1.371			
						(7.17)***			
Military Spending p.c.							0.839		
							(6.59)***		
Democracy (squared)								-0.112	
								(5.10)***	
Year Dummies	No	No	Yes	Yes	No	No	No	No	Yes
Log Pseudo-Likelihood	-2430.50	-2430.46	-2242.36	-2227.51	-2344.50	2288.84	-2309.69	-2329.86	-2226.97
Wald χ^2	13.82***	13.95***	685.60***	808.45***	335.10***	477.49***	371.93***	316.55***	804.62***
Mean VIF			1.13	1.26	1.39	1.36	1.51	11.83	1.26
Zero-always inflation									-1.164
equation for Democracy									(4.89)***

Notes: Dependent variable is the *number of terrorist attacks*. Constant not reported. Absolute robust z-scores in parentheses (using Huber/White sandwich standard errors). *LMI* = dummy variable for lower middle income country. *UMI* = dummy variable for upper middle income country. Income classification according to the World Bank. Model 9 reports results from a zero-inflated negative binomial regression (*ZINB*) specification of Model 4, where the level of democracy is the inflation variable. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$. All explanatory variables are lagged by one year (i.e., by $t-1$). Number of observations is 666 in all model specifications.

Table 4.6: Negative Binomial Regression Results

(absolute) number of terrorist incidents, it may also suggest that demographic stress triggered terrorism in Latin America.

Second, we find that the Cold War era is also positively associated with terrorist activity. This result suggests that international political developments during the Cold War era mattered to terrorism in Latin America, e.g., by governing the level of foreign financial and military assistance channeled to terrorist organizations by one of the superpowers or their respective allies.

Third, we find that the number of terrorist attacks is negatively associated with per capita income and trade openness. This finding implies that in addition to short-run economic performance, long-run socio-economic conditions mattered to terrorism. Consistent with the findings of, e.g., Blomberg and Hess (2008b), socio-economic progress reduced terrorist activity by raising the (opportunity) costs of terrorism. Also, this progress can be expected to correlate with institutional development, offering an additional pathway—e.g., by increasing state and institutional capacity—through which socio-economic success may have been negatively related to terrorism in Latin America.

Fourth, there is some evidence that regime stability reduces terrorism during our period of observation, while guerrilla warfare is a strong positive predictor of terrorism, as in Gassebner and Luechinger (2011). Also, military spending positively correlates with terrorist activity in Latin America. These findings indicate that terrorism is closely associated with political instability and other forms of political violence and that it is used as a means of violence in asymmetric conflicts (e.g., Gassebner and Luechinger, 2011).

Finally, as concerns the level of political development, non-linear specifications (Model 8) and the use of a ZINB model (Model 9) suggest that semi-open countries are most prone to terrorism in Latin America and that the underreporting of terrorism in non-democracy may have an impact.[20] This is in line with Feldmann and Perälä (2004) who argue that

[20] Note that the use of the ZINB model does not influence our findings regarding the effect of economic performance on terrorism. However, the highly significant effect of democracy in the zero-inflation equation implies that non-democracies indeed tend to underreport terrorist activity, as previously found by Drakos and Gofas (2006).

intermediate levels of political development—e.g., as during some periods in Peru, Colombia and Chile—where comparatively good opportunities for political participation coupled with a comparatively poor rule of law, democratic accountability, and human rights abuses were breeding grounds for terrorism.

Robustness

As shown in Table 4.7, our main findings from the series of negative binomial regressions are also robust to the inclusion of additional controls for international conflict, government size and ethnic fractionalization. Table 4.7 also provides information on the operationalization and data sources of these additional controls. Net of the influence of these additional controls, we again find that favorable economic conditions—most importantly, strong economic growth—is negatively associated with terrorist activity in the less developed countries in our sample, while this association is not detected for the higher developed Latin American countries.

4.6 Conclusion

In this contribution we studied the causal relationship between terrorism and economic performance for 18 Latin American countries for the period 1970 to 2007, taking into account the potential complex links between these two variables. We focused on Latin America due to its history of economic growth and terrorism, the ideological profile of many terrorist groups in this part of the world that ought to make them particularly responsive to socio-economic changes, and the lack of empirical studies on the causes and economic costs of Latin American terrorism.

A panel causality analysis yielded no evidence that terrorism had a causal effect on economic growth during the period of observation. This finding may imply that terrorist activity in Latin America was simply not intense enough to inflict economic damage. Alternatively, the attacked economies may have been sufficiently diversified and resilient to absorb any negative economic shock from terrorism.

	(1)	(2)	(3)	(4)	(5)	(6)
Growth*LMI	-0.049	-0.032	-0.049	-0.031	-0.051	-0.033
	(2.71)***	(1.89)*	(2.70)***	(1.69)*	(2.80)***	(1.94)*
Growth*UMI	-0.012	0.004	-0.012	0.004	-0.012	0.004
	(0.59)	(0.23)	(0.59)	(0.21)	(0.60)	(0.22)
Population Size	1.965	1.800	1.974	1.874	1.881	1.748
	(6.64)***	(6.71)***	(6.38)***	(6.81)***	(5.81)***	(6.02)***
Real GDP p.c.	-1.517	-0.731	-1.511	-0.735	-1.460	-0.698
	(6.53)***	(3.75)***	(6.56)***	(3.71)***	(5.77)***	(3.43)***
Democracy	0.003	-0.002	0.003	0.005	0.002	-0.003
	(0.08)	(0.08)	(0.08)	(0.16)	(0.05)	(0.09)
Regime Stability	-0.456	-0.077	-0.456	-0.072	-0.478	-0.089
	(2.77)***	(0.53)	(2.78)***	(0.50)	(2.87)***	(0.63)
Trade Openness	-0.010	-0.014	-0.010	-0.014	-0.011	-0.014
	(0.003)***	(6.17)***	(3.33)***	(6.04)***	(3.57)***	(6.42)***
Cold War Era	1.504		1.507		1.494	
	(6.86)***		(6.87)***		(6.79)***	
International War	0.024	0.136				
	(0.416)	(0.18)				
Government Size			0.002	0.025		
			(0.18)	(2.53)**		
Ethnic					0.280	0.164
Fractionalization					(0.52)	(0.42)
Year Dummies	No	Yes	No	Yes	No	Yes
Log Pseudo-Likelihood	-2344.50	-2227.50	-2344.48	-2225.27	-2344.36	-2227.45
Wald Chi2	337.34***	808.03***	335.54***	825.11***	352.25***	815.36***
Mean VIF	1.35	1.23	1.37	1.24	1.45	1.34

Notes: Dependent variable is the number of terrorist attacks. Constant not reported. Absolute, robust z-scores in parentheses (using Huber/White sandwich standard errors). *LMI* = dummy variable for lower middle income country. *UMI* = dummy variable for upper middle income country. *p<0.10; **p<0.05; ***p<0.01. Results for time dummies not reported. All explantory variables are lagged by one year (i.e., by $t-1$). Number of observations is 666 in all model specifications. *International War* = dummy variable, equals 1 when countries are involved in an international conflict; data drawn from an update of the *UCDP/PRIO Armed Conflict Dataset* (Gleditsch et al., 2002). *Government Size* = ratio of government consumption to real GDP; data drawn from the *PENN World Tables* (Heston et al., 2009). *Ethnic Fractionalization* = (constant) index of ethnic heterogeneity; data drawn from Alesina et al. (2003).

Table 4.7: Negative Binomial Regression Results with Additional Control Variables

By contrast, we found that economic growth mattered to the lower middle income countries in our sample (e.g., Guatemala, Ecuador), but not to the upper middle income economies (e.g., Chile, Brazil). We argued that one the one hand, slower socio-economic progress (compared to the UMI countries) coupled with a lower initial level of economic development made it more likely for socio-economic causes to matter to the calculus of (potential) terrorists and their supporters, thereby, e.g., increasing terrorist mobilization and popular support. On the other hand, we hypothesized that low levels of institutional and state capacity (that correlate with a country's level of economic development) meant that the LMI countries dedicated fewer resources to policy means (e.g., social security spending) that would have otherwise ameliorated economic grievances, making it more plausible that socio-economic factors mattered to terrorist activity in these countries. That is, for the LMI countries there may have been a causal effect of growth on terrorism by virtue of its impact on the costs, benefits and opportunity costs of violence. This does not seem to be true for the UMI countries.

The panel causality analysis results were further supported by a series of negative binomial regressions. The results indicated that economic performance exerted a heterogeneous causal influence on terrorism, with growth only mattering to terrorism in the LMI countries. While the inclusion of additional controls did not compromise the main findings of this contribution, it showed that a variety of further factors also swayed the patterns of terrorism in Latin America. Our contribution indicated that terrorism in Latin America between 1970 and 2007 was fostered by population size, political instability, military spending, the dynamics of the Cold War era, low levels of socio-economic development and economic integration, and intermediate levels of political openness. That is, in addition to having shown that short-run economic performance mattered to terrorism in Latin America, our study also highlighted the importance of structural economic, politico-historic, military and institutional factors in Latin American terrorism.

Our analysis has several implications. First, future research should more thoroughly consider the potentially complex nexus between terrorism and economic performance, e.g.,

by acknowledging the existence of feedback or heterogeneous causality. Underestimating this potential complexity may lead to biased results. Second, for Latin America we find no evidence that terrorism produced economic damage. From an aggregate point of view, excessive spending on counter-terrorism may even be harmful to growth as it redirects resources from more productive investments.[21] The countries of Latin America would be well advised to sustain their macroeconomic resiliency, and future research may try to identify those factors that matter to it (e.g., diversification, institutional quality). Third, for the LMI countries there is evidence that strong economic growth reduced terrorism, even net of the influence of further variables. This finding is in line with Frey and Luechinger (2003), as it indicates that an appropriate tool in the fight against terrorism is to raise its opportunity costs—in addition to raising terrorism's material costs—by promoting socio-economic progress and participation. Policies that foster growth and strengthen institutional quality (so as to mitigate grievances associated with macroeconomic fluctuations and the lack of economic participation) may hence also pay off in the shape of reduced violence.

[21] However, it is challenging for a government to identify the right amount of counter-terrorism expenditures, so as to avoid inefficiencies, given that the level of terrorism ought to depend on the level of counter-terrorism spending. What is more, the loss of life from terrorism and the potentially substantial effect of terrorism on political and sub-national and industry-specific economic development may call for strong counter-terrorism measures, regardless of potential inefficiencies on national levels.

Chapter 5

Concluding Remarks

This doctoral thesis focused on the relationship between socio-economic factors and terrorists activity. For one, it was motivated by the popular discourse which suggests that socio-economic conditions determine terrorism—"poverty causes terrorism"—and that terrorist activity inflicts substantial economic costs on attacked economies. For another, it was inspired by the inconclusive academic evidence regarding the dynamics of the terrorism-economy nexus, with empirical studies on the economic causes and consequences of terrorism being plagued by a number of potential methodological and conceptual shortcomings. This thesis tried to shed further light on a number of research questions. First, does terrorism have economic roots? Second, does terrorism produce (noticeable) economic damage? Third, what is the causal relationship between terrorism and the economy; particularly, does feedback exists, indicating the presence of a vicious circle of increased terrorist and reduced economic activity? Fourth, is there evidence of heterogeneity in the economic causes and consequences of terrorism; particularly, which factors—specific to certain countries or parts of the world—may explain this heterogeneity? Finally, do methodological issues (data sources, measurement issues, econometric methods etc.) add to a better understanding of the terrorism-economy nexus?

The core of this doctoral thesis consists of three research papers that contribute to answering these research questions, while also addressing the methodological and conceptual shortcomings associated with the study of the terrorism-economy nexus. The results of these contributions—*Terrorism in the World of Welfare Capitalism* (Chapter 2), *Causal Linkages between Domestic Terrorism and Economic Growth* (Chapter 3) and *Economic*

Performance and Terrorist Activity in Latin America (Chapter 4)—can be summarized as follows (R1-R4):

(R1) There is a unidirectional (negative) causal effect of economic variables on terrorist activity for Western Europe and Latin America. The findings of this thesis conflict with the empirical mainstream on the roots of terrorism which does not attribute an important role to economic factors in terrorism. Yet, the empirical mainstream usually does not account for heterogeneity in the causes of terrorism, instead assuming a uniform terrorist calculus—which economic factors enter the same way across the board— and estimating an "average" effect of economic variables on terrorist activity. As a matter of fact, the evidence provided by this thesis suggests that terrorism- and country-specific factors matter and that heterogeneity needs to be accounted for. For one, terrorists' ideology arguably governs its responsiveness to economic incentives, with terrorist groups geared towards economic change (e.g., left-wing terrorism) being more responsive to it than groups geared towards broad social change (e.g., Islamist terrorism). For another, country-specific factors (e.g., the level of socio-economic development and the quality of institutions associated with the provision of social policies) also play a role, e.g., by safeguarding a sufficient spread of economic success. Terrorism in Western Europe and Latin America—the focus of this thesis—seems to be particularly responsive to socio-economic incentives due to terrorism-specific and country-specific reasons (e.g., through the provision of functioning institutions that facilitate economic redistribution). Future research may try to identify which terrorism-specific (e.g., ideology) and country-specific (e.g., institutions) factors may explain why there is obvious heterogeneity in the economic causes of terrorism.

(R2) For Western Europe and Latin America there is evidence of (homogeneous) non-causality from terrorism to economic performance, meaning that terrorism has no negative effect on economic growth. Again, this conflicts with the empirical mainstream on the macroeconomic consequences of terrorism which usually finds that terrorism is detrimental to economic activity. As with the roots of terrorism, terrorism- and country-specific factors help to reconcile the findings of this thesis with the empirical mainstream. For one,

terrorist activity in Western Europe and Latin America seems to have been a rather rare, peripheral phenomenon primarily directed against non-business targets, making economic repercussions from terrorism rather unlikely.[1] For another, country-specific factors, which shape the robustness of attacked economies to terrorism, seem to play a role. Throughout this thesis it was argued that economic size and institutional quality are among those country-specific factors that are positively associated with a country's macroeconomic resiliency to terrorism. Future research, however, may try to identify more accurately which terrorism-specific (e.g., targets of terrorism) and country-specific (economic size, democratic institutions etc.) matter to the heterogeneity regarding the economic effects of terrorism, where future large-N studies are also advised to take this heterogeneity into account.

(R3) There seem to be substantial differences between the economic roots and effects of domestic and transnational terrorism. This thesis focused on the underanalyzed issue of domestic terrorism, finding that this kind of terrorism—at least for Western Europe and Latin America—has socio-economic roots, but produces little economic damage. The fact that the empirical mainstream has primarily analyzed the determinants and repercussions of transnational terrorism may (party) explain why the findings of this thesis conflict with this mainstream. On the one hand, it seems that domestic terrorism is more strongly related to (domestic) socio-economic conditions, while international factors (e.g., globalization, foreign policy) seem to more strongly influence the emergence of transnational terrorism. On the other hand, domestic terrorism seems to be less dangerous to economic development than transnational terrorism, even though the former is usually far more common than the latter. Presumably, this is because, e.g., transnational terrorism carries further economic risks (e.g., by deliberately targeting outward-oriented sectors of an economy), while its control is associated with collective action problems due to its international nature

[1] For instance, Sanchez-Cuenca and De La Calle (2011) show that almost half of the lethal terrorist activity in Western Europe between 1965 and 2005 was directed against military targets (the police, military, paramilitaries etc.), while there were almost no deadly attacks against entrepreneuers.

(e.g., Gaibulloev and Sandler, 2011).[2] Future research may provide additional comparative studies on the (economic) origins and effects of domestic and transnational terrorism, given that there is little evidence that both kinds of terrorism interact symmetrically with the economy.

(R4) The use of alternative datasets (e.g., the GTD), socio-economic variables (e.g., social spending instead of GDP p.c.) and econometric techniques (panel VAR, causality tests etc.) may contribute to a better understanding of the terrorism-economy nexus. For instance, in this doctoral thesis (cf. Chapter 3) tools of time-series analysis (unit root tests, VAR, Granger causality tests) were used to simultaneously consider the causal effect of terrorism on the economy and vice versa, while previous empirical research has assumed a "fixed" causal relationship between the two. Given the inconclusive evidence on the economic causes and consequences of terrorism as it follows from "standard" empirical analyses on these issues, it seems appropriate that future research continues to employ alternative empirical approaches. One recent examples of such an alternative approach is Blomberg et al. (2011) who study the role of ideology and country-specific variables on the duration of terrorist groups (while the dependent variable in related "conventional" analyses is the number of attacks these groups produce).

Previously, the implications of the results of this doctoral thesis for future research were already highlighted when discussing its main findings. However, some policy implications (P1-P4) can also be deduced:

(P1) Attacked economies in Western Europe and Latin America appear to be sufficiently resilient to the economic threat of domestic terrorism. While counter-terrorism spending may benefit certain sectors of the economy such as, e.g., the defence industry (e.g., Koh, 2007; Berrebi and Klor, 2010), it seems to be inefficient to allocate economic resources to the fight against domestic terrorism when its economic costs are negligible and when this resource allocation hurts the commitment to other forms of (growth-inducing) pub-

[2] See Lee (1988) and Sandler (2005) for an in-depth discussion of collective action problems (e.g., free and paid riding) associated with the fight against transnational terrorism.

lic investment on, e.g., health, infrastructure or education (Gupta et al., 2004). Rather, it seems sufficient that attacked economies in Western Europe and Latin America uphold their robustness to domestic terrorism through policies that foster, e.g., institutional quality, decentralization and economic diversification. Alternatively, they may focus their counter-terrorism efforts on the prevention of transnational terrorism which seems to more dangerous to economic activity.

(P2) Given that the results of this thesis indicate that terrorism in Western Europe and Latin America is (partly) rooted in unfavorable socio-economic conditions, countries in these parts of the world may benefit from policies that promote economic growth (i.e., policies that increase the economic pie) or that facilitate economic participation and redistribution (i.e., policies that distribute the economic pie more fairly). Such policies are expected to influence the terrorists' calculus in ways that make violence less likely, particularly given that ideological alignment and goals of terrorist groups in Western Europe and Latin America seem to be prominently shaped by economic motives. Consistent with rational-choice theory, such policies ought to deter terrorism by raising the opportunity costs of terrorism (e.g., by improving socio-economic redistribution)

(P3) As a first caveat, the prevalence of heterogeneity in the causes and consequences of terrorism—highlighted throughout this thesis—does not suggest that the previous policy implications can be easily transferred to other parts of the world. For one, it seems to be the case that countries outside Western Europe and Latin America (e.g., in Sub-Saharan Africa and the Middle East) are more vulnerable to terrorism and may thereby more strongly benefit from counter-terrorism efforts (e.g., Sandler and Enders, 2008; Gaibulloev and Sandler, 2011). For another, terrorism in Africa, the Middle East and Southeast Asia seems to be less responsive to socio-economic incentives, where terrorism in these parts of the world is geared more towards religious motives (e.g., Islamist terrorism), while weak institutions do not provide sufficient means of socio-economic participation (e.g., Kitschelt, 2004; Kutan, 2004; Piazza, 2007; Freeman, 2008). In fact, some evidence indicates that demographic (e.g., youth burdens), politico-institutional (e.g., kleptocratic regimes) and

international (e.g., foreign policy) factors and trends matter more decisively to terrorism outside Western Europe and Latin America (e.g., Kitschelt, 2004; Piazza, 2007; Freeman, 2008). Consequently, these countries may more strongly benefit from policies that ameliorate unfavorable demographic, political and international rather than socio-economic conditions. These findings suggests that socio-economic underdevelopment is neither a necessary nor sufficient conditions for the emergence of terrorism.

(P4) As a second caveat, it seems necessary to hint at the possibility that socio-economic success may not automatically "buy" internal peace. This is because economic progress is likely to matter differently to active terrorists and to those parts of the population that support terrorism by, e.g., providing financial and other material resources or sanctuary. The economic (rational) calculus of the former can be expected to be less responsive to economic incentives, particularly when a supreme value ideology (e.g., Islamism) is involved (e.g., Bernholz, 2004, 2006) or when surrendering means to face long prison sentences due to committed crimes. Therefore, a number of studies on the economics of counter-terrorism suggest that active ("hard-core") members of a terrorist groups can be better fought by means that destroy the social cohesion of these groups, e.g., through principal witness programs, amnesties or the infiltration of such groups by double agents (Frey and Luechinger, 2003; Abrahms, 2008). Following this line of reasoning, economic progress then seems to be more likely to reduce terrorism by shrinking popular support for terrorism on which many terrorist groups crucially depend (Paul, 2010). Economic growth and access to economic resources through participatory and redistributionary policies ought to raise the opportunity costs of terrorist supporters and future recruits, while these groups—in comparison to active members—at the same time do not face the (potentially prohibitively) high costs of leaving terrorism behind. Indeed, Cronin (2006) finds that many terrorist groups have ceased to exists due to the failure of generational transition and a loss of popular support, where both of these developments are likely to be aided by socio-economic improvements for those parts of the population that would have otherwise been sympathetic or supportive of terrorism.

The Chinese revolutionary Mao Zedong famously argued that the "[...] guerrilla must move amongst the people as a fish swims in the sea" (cited in Paul, 2010: 488). For one, the findings of this thesis suggest that economic systems in Western Europe and Latin America are sufficiently resilient to withstand the terrorist threat of the "fishes". For another, its findings also suggest that through socio-economic incentives—provided by, e.g., sound economic growth and welfare policies—terrorism in these parts of the world can be effectively marginalized, draining its popular appeal and support (i.e., "the sea") through the provision of non-violent economic alternatives which raise the opportunity costs of terrorism.

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