

Politikberatung kompakt

41

Tilman Brück • Marie Karaisl • Friedrich Schneider

A Survey on the Economics of Security

Berlin, 2008

IMPRESSUM

© DIW Berlin, 2008

DIW Berlin
Deutsches Institut für Wirtschaftsforschung
Mohrenstraße 58
10117 Berlin
Tel. +49 (30) 897 89-0
Fax +49 (30) 897 89-200
www.diw.de

ISBN-10 3-938762-32-2
ISBN-13 978-3-938762-32-5
ISSN 1614-6921

Alle Rechte vorbehalten.
Abdruck oder vergleichbare
Verwendung von Arbeiten
des DIW Berlin ist auch in
Auszügen nur mit vorheriger
schriftlicher Genehmigung
gestattet.

DIW Berlin: Politikberatung kompakt 41

Tilman Brück*

Marie Karaisl**

Friedrich Schneider***

A Survey on the Economics of Security

Final Report

For the European Commission, Directorate-General for Justice,
Freedom and Security

Berlin, April 2008

* DIW Berlin, Department of International Economics. tbrück@diw.de

** DIW Berlin, Department of International Economics. mkaraisl@diw.de

*** Johannes-Kepler-Universität, Linz, Austria. friedrich.schneider@jku.at

Acknowledgements

We thank our project advisors Professors Kostas Drakos, Bruno S. Frey (senior advisor), Javier Gardeazábal, and José Tavares for their valuable advice in the preparation of this report. All opinions expressed are those of the authors alone.

This Survey and the information it contains is property of the European Commission.

Contents

1 EXECUTIVE SUMMARY	1
1.1 Motivation and aims of the study	1
1.2 Key findings of the survey	2
1.2.1 Direct and indirect economic impacts of terrorist attacks	2
1.2.2 Economic effects of anti-terrorism policy	4
1.2.3 Dynamics between security and insecurity	5
1.3 Research needs and recommendations	7
1.3.1 Gaps in the literature	7
1.3.2 Recommended future research	8
1.4 EU research capacity	9
2 INTRODUCTION	10
2.1 Expected benefits at the European level	12
2.2 Scope and tasks of the survey	13
3 RESEARCH METHODOLOGY	15
3.1 Definitions and concepts	15
3.1.1 Risk and insecurity	15
3.1.2 Security	16
3.1.3 Terrorism	17
3.1.4 Security economics	18
3.2 Data sources	18
3.2.1 Information collection activities	18
3.2.2 Geographical scope of information gathering	19
3.2.3 Key informants and stakeholders	19
3.3 Research approach and methodological considerations	19
3.3.1 Research approach	19
3.3.2 Other methodological considerations	21
4 ECONOMICS OF INSECURITY – ECONOMIC EFFECTS OF TERRORIST ATTACKS	24
4.1 Existing studies and research	24
4.1.1 Micro-economic impacts	24
4.1.2 Impacts across sectors	32
4.1.3 Impacts on financial markets	34

4.1.4	Macro-economic impacts	36
4.1.5	The determinants of the economic impacts of terrorist attacks	38
4.2	Limitations in the existing literature	41
4.2.1	Micro-economic impacts	41
4.2.2	Macro-economic impacts	42
5	ECONOMIC EFFECTS OF ANTI-TERRORISM MEASURES	44
5.1	Existing studies and research	46
5.1.1	Micro-economic impacts	46
5.1.2	Impacts across sectors	51
5.1.3	Macro-economic impacts	56
5.1.4	Trans-national and global impacts	60
5.1.5	Impacts on civil rights and democracy	61
5.1.6	The determinants of the economic impacts of anti-terrorism policy	61
5.2	Limitations in the existing literature	64
5.2.1	Micro-economic analysis	64
5.2.2	Macro-economic analysis	65
6	INTERACTION OF ACTORS OF INSECURITY AND SECURITY	67
6.1	Existing studies and research	67
6.1.1	What determines terrorist behaviour	67
6.1.2	Defensive policies	69
6.1.3	Proactive policies	71
6.1.4	The determinants of the dynamics between security and insecurity	75
6.2	Limitations in the existing literature	78
6.2.1	Preferences and motivations of individual terrorists	78
6.2.2	Organisations' behaviour	78
6.2.3	Interactions	79
7	KEY FINDINGS OF THE LITERATURE SURVEY	80
8	RESEARCH NEEDS AND RECOMMENDATIONS	83
8.1	The structure and behaviour of terror organisations	83
8.2	The structure and behaviour of targets of terrorism	84
8.3	The economic impacts of terrorism	85
8.4	The economic impacts of security measures	85
8.5	Conceptual ground work	86
8.6	Data collection and methodologies	87

8.7 Policy relevant knowledge	87
9 EUROPEAN RESEARCH CAPACITY IN THE ECONOMICS OF SECURITY	89
9.1 Excellence of researchers	90
9.2 Research infrastructure	92
9.3 Institutional set-up	93
9.4 Assessment and recommendations	95
10 BIBLIOGRAPHY	108

Tables

Table 5-1: Classification of different types of counter-terror measures	44
Table 9-1: Research centres in the European Union working on security economics.....	97
Table 9-2: Selected research centres in EU associate countries working on security economics	101
Table 9-3: Selected major research centres in the US working on security economics	103
Table 9-4: List of key EU security economists.....	105

Abstract

This report assesses the literature on the inter-relations between the economy and security with particular focus on terrorism and the “human drivers of insecurity” to identify both available knowledge and crucial research gaps. In addition, the report surveys the European research capacity in the field of security economics. The study is based on a thorough literature survey of the newly emerging field of security economics, using a variety of electronic catalogues and search engines as sources.

The study reveals that it is not just terror attacks but also security measures of private and public agents responding to the threat of terrorism that incur significant repercussions for the economy, often with trans-national consequences. Impacts vary with the maturity of an economy; appropriate ex ante and ex post policies are critical to contain the damage of terrorism. Given the dynamic nature of human-induced insecurity, policies should place emphasis on “systemic resilience”.

Gaps in the economic security literature include insufficient knowledge of the behaviour of terrorists and their targets. Furthermore, the global impacts of terror attacks and especially of security measures require more analysis. Future research requires a more rigorous conceptual framework, methodological improvements and, above all, better data.

In comparison to the United States, the current research capacity in security economics in Europe is weak. On the one hand, there is significant research potential in the field of security economics within the European Union in the shape of several high quality researchers. On the other hand, the existing research infrastructure and institutional barriers both inhibit this potential from being developed academically and for policy advice. Establishing a European network of security economists and funding a European centre for security economics could contribute to remedy this situation.

1 EXECUTIVE SUMMARY

1.1 Motivation and aims of the study

One important feature of what is widely called the “new terrorism” (Maurer 2007) is its objective of harming the twin processes of economic growth in developed countries and of globalization in general; global terrorism therefore has an important economic dimension. While the economic repercussions of terrorist attacks, especially the repercussions of 9/11, have been very visible, what is less obvious and thus less entrenched in public awareness are the economic consequences of security measures and counter-terrorism policies. The European Union is committed to create and safeguard a European area of freedom and security while at the same time building an area of prosperity and economic growth. Yet, the analytical and empirical interplay between security and economic prosperity are still insufficiently understood in academic and policy circles.

In order to provide an overview of research gaps and future research needs, this *survey aims to map the “state of play of research” on the inter-relations between the economy and security with particular focus on terrorism and to identify the level of knowledge on the interaction between the cost distribution of both terrorism and anti-terrorism measures*. To this end, the survey analyses the existing knowledge on the macro-economic impacts and the current understanding of underlying processes at the micro-economic level. Apart from considering aggregate indicators such as fiscal and trade impacts, investment, growth and productivity, the survey assesses the existing research on the impacts of insecurity on behavioural patterns of consumers, households, the private sector (in general, as well as specific sectors) and policy makers, that ultimately determine impacts at aggregate macro-economic level.

In addition, *the report identifies institutes and research centres working on the economics of security with particular emphasis on the interplay between economy, terrorism and anti-terrorism measures and considers whether a critical mass exists to launch a pan-European network of such centres and institutes*. This helps to assess the present capacity of the European Union (EU) to fill knowledge gaps and advance research in security economies. In this respect the report assesses the number and capacity of EU security economists, the

available research infrastructure and the prevailing institutional set-up to foster the development of the newly emerging discipline of security economics.

1.2 Key findings of the survey

The economic impacts of terrorism derive from three inter-related effects 1) direct and indirect economic impacts caused by acts of terrorism 2) the direct and indirect economic impacts resulting from security measures taken by private and public agents and 3) the dynamics that security measures trigger in the patterns of acts of terrorism.

1.2.1 Direct and indirect economic impacts of terrorist attacks

Accounting for the economic impacts of acts of terrorism involves two factors: on the one hand, costs arise from physical destruction, the loss of human life and health, and with respect to the latter the longer term costs resulting from the treatment of chronic injuries and potential psychological traumas. On the other hand, **terrorist attacks incur indirect impacts resulting from the disruption of economic processes and activities, which may not be confined to the terrorised economy itself but may spill over to other activities, sectors and economies.**

The relative size of the direct costs of terrorism which households, firms and the public sector have to bear is determined by the nature and the target of terrorism, i.e. it varies across events. Yet, irrespective of the nature and type of attack, economists argue that costs are likely to be underestimated as non-monetary impacts, such as repercussions on psychological wellbeing and life satisfaction, are not accounted for. These impacts may be economically significant due to their potential repercussions on labour productivity.

For the private sector substantial costs arise to those sectors directly hit by terrorist attacks. In the past only a few selected sectors have been regular targets of terrorist attacks and have received substantial attention in the literature, such as the transport and tourism sector but also the insurance sector. Governments will face direct costs resulting from the destruction of public infrastructure but will also incur costs to provide rescue and emergency operations. In the history of terrorism, 9/11 incurred unprecedented costs to firms and the US government estimated to lie between US\$ 25-60 billion. In contrast to this outlier, “conventional” attacks will incur much more limited costs.

Apart from direct economic costs, terrorist attacks incur indirect impacts through the disruption of economic processes, which given the inter-connectivity of the global economy can incur significant repercussions. More generally, terrorism can impact on companies through increasing their overall level of market risk, credit risk, operational risk and business volume risk.

Terrorism can trigger immediate reactions by economic agents (households, firms, governments) which can aggravate or even extent the economic losses. Stock market reactions to terrorism provide an example. Protracted terrorist activity - such as in Israel or Spain have shown to significantly impact on stock market values. In contrast, even though 9/11 produced an initially significant shock in global stock markets these were mitigated. This was ensured on the one hand, by an increased resilience of the diversified financial system to absorb shocks. Thus, **globalisation has on the one hand enhanced the resilience of economies to large scale shocks while on the other increased the vulnerability of economies and economic agents to be affected by the repercussions of initially local events such as a terrorist attack.** On the other hand, stock market impacts were mitigated by the swift policy reactions of the Federal Reserve and European Central Bank. **Thus, appropriate policy decisions are critical to contain worst economic impacts of terrorism** not only by helping economic agents to resume their activities but especially by restoring confidence into the economy.

At the aggregate, macro-economic level, the economic repercussions of terrorism on growth have shown to be transient in large, well diversified economies, which can easily absorb shocks. Despite its scale, 9/11 did not have a permanent impact on the US economy. In contrast, **terrorism can derive significant long term negative impacts on small, less developed economies**, especially when terrorist events recur frequently.

In summary, the economic impacts of acts of terrorism are determined by the nature, scale and frequency of terror activities; the immediate response reactions of economic agents which contribute to mitigate or aggravate attacks; and the maturity of the economic system and thus its ability to absorb shocks and contain spill-over effects. Given the uncertainty about the nature and scale of future terrorist events, **more attention should be paid by researchers and policy makers to the significance of “systemic resilience” to buffer terror attacks.**

1.2.2 Economic effects of anti-terrorism policy

Security measures taken by economic agents to protect themselves against terrorism, mitigate its impacts, or minimise the risk of terrorism altogether, include investments in security technologies and emergency relief, and adaptation of consumption and investment behaviour according to risk perceptions. Economic impacts therefore have to account for the direct investment expenditure into security technologies, their opportunity costs, externalities and spill over effects as well as the impacts that changes in consumption and investment patterns incur on the economy. Overall, little disaggregate analyses of security measures taken by households, private and public agents exist. Yet, the growth in demand for security technologies (see Section 5.1.2) shows that economic agents do invest in security.

Corresponding to the substantial losses incurred by sectors directly struck by terrorism, these sectors also face the greatest costs due to security expenditures and changes in demand for their goods and services. For example, the introduction of tightened security regulations incurred additional security spending of approximately US\$ 43 billion for airlines, while airport operators are expected to spend an additional US\$ 56 million annually on security measures after 9/11. In addition, the aviation industry experienced a loss in demand amounting to US\$ 15 billion in 2001. The literature quantifies similarly devastating losses due to changes in demand for the tourism industry. In contrast, the growth of demand that the security industry records shows that security investments can have positive, not only negative, impacts. There is little systematic and comparable information on the security measures taken across countries at the government level, apart from indications of defence and homeland security budgets. Since 9/11 a diversified set of security measures has been employed by the US and European countries, including protection of potential targets, proactive steps to fight terrorism and the mitigation of impacts (e.g. regulations in the insurance industry). However, the literature recognises a proclivity towards over-investing in protective measures at the expense of pro-active measures.

These measures not only impact on governments' budgets but can have implications for the economy at large. Especially in the case of low- and middle-income countries security and defence spending to fight terrorism may not only increase budget deficits but crowd out economically and socially significant investment thus jeopardising economic development. The literature does not find indications that increased spending on security will negatively impact on growth in large economies, though no conclusions are available for low to middle

income economies. Apart from these fiscal impacts, increases in the level of security are hypothesised to stifle economic efficiency. Tightened security regulations at transport hubs increase transaction costs of trade with possible negative repercussions on trading times and thus costs, but also trade volumes. Yet, these conclusions are based on back of the envelope estimations generated shortly after 9/11 and so far no updated empirical research appears to be available.

Beyond aggregate impacts at national level, security measures can have trans-national repercussions particular where economic activities entail more than two countries, such as trade or foreign investment but also development aid. Transnational impacts may become even more significant where pro-active security measures of terror target countries are aimed at states who host terrorists.

In summary, **it is not only terrorist attacks themselves but the threat of terrorism which incurs impacts on the economy in the form of security measures that economic agents across all levels take.** The economic repercussion of security measures are determined primarily by the type of measures which are adopted, by the level of economic development, the size of the domestic security industry, which derives benefits from investments in security spending. **Although empirical evidence is scant the literature suggests that these security measures can have significant economic repercussions at both macro- and micro-economic level. Given political and economic inter-dependencies, economic repercussions of both terrorism and security measures can stretch beyond national economies.**

1.2.3 Dynamics between security and insecurity

A full account of economic impacts of security measures should incorporate the impacts these measures have on terrorist behaviour. While security measures aim to decrease impacts or the threat altogether, the literature shows that outcomes may differ markedly from the original aim. Although empirical evidence is hardly available, some “stylised facts” of strategic terrorist behaviour can be derived. According to these stylised facts, terrorists undermine defensive policies, by changing their targets which could include a shift to a whole new geographic area, their forms of attack or the timing of their attack. With respect to defensive measures, that aim to decrease resource endowments of terror organisations, terrorists will change the structure and management of their organisations to circumvent restrictions on their

activities. **In practice, the literature argues that terrorism in response to security measures has become more severe; shifted to relatively more permissive locations (such as the Middle East and Asia); and has decentralised its organisational structures to evade proactive policies as illustrated for example by the elusive network structure of al-Qaeda.**

These stylised facts build on the assumption that terrorists behave like rational economic agents, which implies that they hold a well defined set of preferences, and will select their preferred choice of action to maximise utility within a given resource constraint. Terrorists face the choice to allocate their resource endowments between terrorist and non-terrorist activities; a change in the relative price of one will result in a shift towards the relatively cheaper other activity, be it a different form of terrorist, or non-terrorist action. The “price” can be equated with the economic costs that terrorists have to incur to execute an attack or the benefits derived from an attack. Both, costs or benefits, change with the level of security, the first in a positive, the latter in a negative relation. Although this model has proven useful, its explanatory power is restricted due to simplified assumptions about the nature and characteristics of individual terrorists and terror organisations as a whole: first, it does not differentiate between differing motivations and preferences of individual terrorists that will determine how willing individuals are to give up their violent activities; second, the model does not account for factors that will determine the “price” or “value” of terrorist actions besides security measures themselves.

The analysis of the dynamic interactions of terrorists and governments is constrained due to the lack of representative data indicating terrorist activity and security policy measures. Measuring the responses to security measures based on the number and characteristics of terror attack may provide some information but cannot track changes in the underlying terror activity. Thus, unless better indicators for terror and anti-terror activities are found, models on the response reactions of terrorist organisations to security measures cannot be tested empirically.

1.3 Research needs and recommendations

1.3.1 Gaps in the literature

The review of the existing literature and knowledge uncovers six critical research gaps:

1. The available empirical literature focuses largely on the macro-economic outcomes rather than understanding the underlying processes that lead to these impacts. Particularly little is known about the structure and behaviour of terror organisations, with the consequence that only limited conclusions can be drawn about the impacts and effectiveness of security measures to reduce terrorism.
2. The security economics literature focuses on the negative impacts caused by perpetrators but rather neglects impacts resulting from responses to terrorism. As the literature survey shows, economic impacts of terrorist events are transient in large economies but can be extended due to security reactions of targeted agents. Yet, no detailed research is available that studies the actual responses of economic agents to terrorism. Related to this, no aggregate analysis exists that studies the macro-economic consequences of security measures on economies.
3. Further, the literature is heavily biased to impacts of terrorism in industrialised countries, even though it is shown that a) most terrorism is occurring in relatively less developed countries, b) economic development in less developed economies can be negatively affected by both terrorism and security measures and c) there may be a relation between economic grievances and terrorist activities in terror host countries. Thus understanding the dynamics of terror in small economies may prove critical for the understanding of insecurity in the EU.
4. Terrorism and counter-terrorist measures are often analysed in isolation in the literature, although this form of insecurity represents only one element in a larger “portfolio of risks” which includes other factors of insecurity such as organised crime and conflicts. Further, there are several indications of substantial conceptual and practical overlaps between diverse threats to security which should be analysed within an integrated framework of the “human drivers of insecurity”.
5. Much knowledge is based on theoretical reasoning with only limited and highly fragmented empirical evidence to substantiate the theory. The major cause of this gap

is the restricted availability of data not only of terrorist behaviour but also of the behaviour of targets and their governments.

6. Last but not least, up to today only little of the academic research has been turned into readily available policy knowledge.

1.3.2 Recommended future research

Building on these knowledge gaps, the report suggests the following areas for future research:

1. **Structure and behaviour of terror organisations.** This research area should provide a more nuanced insight into terrorists' preferences and motivations, the emergence, evolution and cessation of terror organisations and their inter-relation with actors of security and insecurity not least to be able to understand the effectiveness of security measures to thwart terrorism. This should also include an analysis of the symbiosis of terror organisations and fragile states.
2. **Structure and behaviour of targeted agents:** This area of enquiry should provide a more coherent overview of the type of security measures taken by different economic agents, the reason for their choices and the consequences these have at micro-economic level.
3. **The economic impacts of terrorism.** Even though this area has been researched in relative more detail, the analysis should be extended to cover a wider range of countries, especially developing countries. Further, while knowledge exists on the impacts of terror *attacks* on the economy no information is available on the economic repercussions of underlying *terror activities* especially in host countries.
4. **The economic impacts of security measures.** This area of research should focus particularly on the quantification of dynamic costs but also benefits derived from security measures. Cost calculations should place specific emphasis on less visible impacts such as increased frictional costs, decreased efficiency and trans-boundary impacts. In other words the dynamic inter-play between security and growth.
5. **Conceptual ground work** is requires to overcome the isolated analysis of terrorism and place it into a larger framework of security and insecurity.
6. **Data collection and methodologies.** More representative data of terror activity and the application of methodologies able to account for the various non-monetary impacts

of terrorism are critical to provide a more accurate quantification of impacts and repercussions of terrorism and security measures.

7. **Policy relevant knowledge.** Apart from general accounts of security measures, a critical analysis of current EU policy should identify their coherence across member states, their effectiveness and their potential negative repercussions.

1.4 EU research capacity

The analysis of the research capacity in the discipline of security economics in the European Union and beyond shows that there is substantial research potential embodied in a number of high quality academics interested in the economic analysis of security and terrorism. **Yet, the current research infrastructure and institutional set up in the European Union create significant barriers to maximise the potential and capacity of security economics.** In fact, there does not yet exist a critical mass of European security economists to ensure the viability of this new discipline, especially vis-à-vis the much larger capacity of the United States. The barriers are less manifest in the quality of the researchers involved in this emerging field but they relate to the existing research infrastructure and institutional barriers. These barriers also questions the success of combining sound economic and security policy making with a view to achieve “secure growth” in Europe.

The creation of a research network would allow security economists to communicate and cooperate and to enhance the visibility of economics and economists in security policy making. Such network could contribute towards establishing a minimum critical mass of European research capacity in the field of security economics. Further steps would be the establishment of a European centre for security economics and more national support for research on security economics.

The economics of security is one of the most important issues in our discipline, yet, the one least researched

(Martin Feldstein, Former President of the American Economic Association, speaking at the Annual Meeting of the American Economic Association, Chicago, 5 January 2007)

Economic theory in particular can offer key insights, enabling governments to optimise their efforts to enhance security and growth. (ESRAB, 2006)

2 INTRODUCTION

The study aims to survey the existing knowledge on the economics of security in the literature and to identify gaps in knowledge and expertise. Further, it assesses the European research capacity, its strengths and weaknesses in this field, and, as far as possible, produces a complete list of research centres and institutes on the economics of security within the European Union (EU) and of major ones outside of Europe.

One important feature of what is widely called the “new terrorism” (Maurer 2007) is its objective of harming the twin processes of economic growth in developed countries and of globalization in general. Terrorism therefore has an important economic dimension, for example, by reducing bilateral trade flows and annual direct foreign investment inflows, by causing a negative relative performance of stocks and by damaging the tourist industry, thus, causing a huge loss of income in the affected country. Yet, the fight against terrorism also has strong economic consequences, for example by affecting the ease of travel or trade, by targeting insurance regulations or by dampening consumers’ and firms’ expectations.

The European Union is committed to create and safeguard a European area of freedom, security and justice. At the same time, the European Union is building an area of prosperity and economic growth. It is obvious that these two aspects are closely inter-linked: security influences prosperity and vice versa (European Commission 2006: 1). The need to protect liberal societies against terrorism must therefore be balanced against the need to protect market economies from too much regulation in the name of security. On the one hand, it is

argued that trade-offs between security and economic freedom have to be made in the fight against terrorism. On the other hand, it may be possible to develop a synthesis whereby market economies remain secure and prosperous. In effect, the “security economy” may have to learn from the “green economy” to reconcile security and growth (Brück, 2004).

The European Commission has made important advances in recognizing the potential contribution of economics in the analysis of security. The European Security Research Advisory Board states that “economic theory in particular can offer key insights, enabling governments to optimise their efforts to enhance security and growth” (ESRAB 2006:59). Building on this insight, the Seventh Framework Programme for Research and Technological Development (FP7) recognizes not only the role of security as research programme but dedicates funds explicitly to the area “security economics”.

However, the European Union is not yet sufficiently prepared to intellectually meet this challenge. Its capacity for economic analysis and policy making in this field is still weak, especially in comparison with the United States. This is a result from several factors: first, the large geographical dispersion of economic research capacity on terrorism and anti-terror policy plays a role; second, experts are spread across many different sub-disciplines in economics, which often do not communicate with each other. Third, many authors publishing books and articles in the field of economics of security usually work on other themes and simply lend their expertise to the analysis of terror-related economic phenomena on a temporary basis, thus making experts on economics of security a very transient phenomenon. Still the economic literature on terrorism has made remarkable inroads (Frey 2004; Brück 2006; Enders and Sandler 2006) building on already available research, which had previously not received much attention. Nevertheless, despite of remarkable progress, different areas of research remain insufficiently integrated and various aspects still need to be studied in depth (Llusa and Tavares 2006).

This report provides an in-depth analysis of existing research and assesses the possibility to create a network of experts on the economic analysis of terrorism and counter-terrorist measures.

2.1 Expected benefits at the European level

The survey will derive following benefits at the European level:

First, the study brings together knowledge and makes expertise available to academic researchers and policy-makers in Europe. Hence, it will help “to make collective policy responses to the terrorist threat” which are seen as crucial in the European Union Counter-Terrorism Strategy (Council of the European Union 2005: 4). It will contribute to develop European scientific knowledge and to strengthen the European research capacity on security and insecurity thus helping to break the quasi research monopoly of the United States.

Second, the study will provide the groundwork to build a future research agenda, which could be coordinated through the planned European Forum for Security Research and Innovation (ESRIF). To this end, it identifies critical questions and issues which require further research. In this respect, the integration of economics into security research and of new security issues into economic research creates an important balance to the technologically oriented approaches to fight terrorism. Even if new technologies can help fight terrorism, their effectiveness is also determined by their social, political and economic characteristics and circumstances. This study therefore attempts to give a first assessment of anti-terror policy interventions from an economic perspective.

Third, fighting terrorism requires a profound understanding of the underlying patterns and dynamics of terror behaviour. Economic approaches can not only contribute to model and therefore comprehend the symptoms of terrorist activity but can also provide insights into underlying motives and root causes of terrorism.

Lastly, recognising that the present economic vulnerabilities to terrorism are not only caused by the threat itself, but also by the characteristics of the global economy, this study provides a first entry to the discussion of the trade-offs between “sustainable systemic security” versus economic efficiency and competitiveness. This survey aims to provide an overview of the available knowledge which is necessary to initiate a debate on the trade-offs between security and the economy. Ultimately, this study is a stepping stone for a larger project to identify opportunities and obstacles to Europe’s objective to “become the most competitive (...) economy in the world by 2010”, as stated in the Lisbon Strategy.

2.2 Scope and tasks of the survey

According to the guidelines laid out in the terms of reference, this survey presents and comments on the existing research and knowledge on the inter-relation between economy and security – with a particular focus on terrorism - in a comprehensive manner. It incorporates an analysis of the level of knowledge about the causal chains between security respectively insecurity and economy to show how the former translate themselves into the latter. Relevant knowledge on the interaction between the costs distribution of both terrorism and anti-terrorism measures are identified as well. With reference to the above mentioned tasks, the survey gives special emphasis to the direct and indirect economic consequences of terrorism and anti-terrorism measures for the European economy.

Furthermore, the survey assesses the European research capacity in the field of economics of security and identifies possible weaknesses. It points out fields of research that yet need to be studied thoroughly in order to aggregate the existing knowledge and propose ways of enhancing research in these fields in the future. Moreover, the study shows where relevant expertise outside of the European Union lies. This is meant to help scholars and policy makers to draw on useful sources beyond the geographical scope of the European Union, too.

Last but not least, the survey identifies research centres and institutes within the 27 member states of the European Union which specialize on the economics of security focussing on the interplay between economy, terrorism and anti-terrorism measures, or similar fields of research. The survey analyzes to what extent a critical mass of such institutions and expertise exists and will propose ways of linking European experts on the economics of security, thus helping to connect and aggregate relevant knowledge and expertise across the European Union.

Since the survey concentrates on the impacts and dynamic effects of terrorism in the short- to long-run it will not provide a detailed analysis of the literature on the origins and causes of terrorism as such. It will consider drivers and determinants of terrorism in so far as it is important to provide insights into the dynamics between security measures and terrorist events in the long run. Further, as this survey focuses on perspectives and methodologies from the discipline of economics, it largely excludes non-economic literature on terrorism. However, it should be noted that this non-economic literature is not only extensive but should be seen as complementary to the economics literature not least as it covers some issues and

aspects which have so far been overlooked by economists. In other words, economics contributes to the study of terrorism with important tools, yet it is not sufficient to understand all the complexities of the security-insecurity nexus.

3 RESEARCH METHODOLOGY

3.1 Definitions and concepts

The terror attacks that destroyed the World Trade Centre in New York September 11th, 2001 (hereafter 9/11) and subsequent attacks in Europe have introduced a new dimension of terrorism. 9/11 and subsequent terror attacks have challenged existing notions on the “ethics” of terrorist organisations and created a new atmosphere of uncertainty: as the unimaginable happened, the large scale terrorist events since 2001 have turned a low probability event, into an event with a higher likelihood, but also into an event whose likelihood cannot be estimated. In other words, what was previously rejected as significantly unlikely has now become not only possible but also probable. Yet, given lack of data it is difficult to predict the actual level of probability. Consequently, although previous historic incidences such as nuclear accidents had enhanced the awareness of living in a “risk society” 9/11 has further influenced conceptions of risk, insecurity and vice versa security.

3.1.1 Risk and insecurity

Brück (2006) defines insecurity as “aggregate, unquantifiable form of risk”, risk as the probability of a harmful event to happen (where the level of risk rises with an indicator being close to its threshold) and consequently, security as the absence of this risk, i.e. a zero probability of a harmful event to happen (Brück 2006). A conceptually similar portrayal is provided by Czinkota (in Suder 2004) who differentiates between risk and uncertainty. Risk is a known entity to the extent that its probability can be estimated, e.g. based on certain variables which have been derived historically or through research; yet, uncertainty implies the impossibility to quantify the probability of an event to happen. In sharp contrast to for example natural disasters that are somewhat predictable, terrorists or more generally “human drivers of insecurity” deliberately seek to evade attempts for prediction thus reproducing uncertainty or creating an environment of “dynamic insecurity”.

Terrorism is not the only source of insecurity, but only one among many others, such as organised crime, political instability or economic shocks, natural disasters or industrial accidents. Consequently, the risk of terrorism is defined not only by its own absolute

probability but also by the likelihood of other events to happen. Given that the “portfolio of risks” and their likelihoods vary across time, across countries and across stakeholders, the importance that is assigned to a particular element of insecurity, e.g. terrorism and its salience on the policy agenda will vary as well. Moreover, the notion of risk is not objectively defined but strongly influenced by individual’s perceptions and risk aversion which is often based on cognitive experiences of the past rather than estimations of probability of future events. Consequently, security policy at the level of the European Union has to consider that national security priorities will vary across member states given that each member state has to manage its specific set of insecurities and risks.

3.1.2 Security

The phenomenon of “dynamic insecurity” has important repercussions on notions of “security” and security provision. As Auerswald, Branscomb et al. (2005) suggest the goals of security provision, need to be redefined shifting from the objective to protect potential targets against all possible risk factors, towards the notion to enhance systemic resilience through building capabilities to minimise impacts in case of attack. It might be more sustainable to decrease vulnerabilities and increase the resilience of (economic) systems overall, rather than trying to fight a single cause of insecurity in isolated fashion.

This concept of security provision is based on the understanding that insecurity and vulnerability are two sides of the same coin. In other words, the level of both risk and uncertainty is determined not just by the threat per se but by the degree of systemic vulnerability. Kunreuther (2006) building for example on Beck’s Risk Society (1992) identifies the current state of inter-dependencies in the economic context as a critical factor of vulnerability. These interdependencies imply that a local event can have global repercussions and as a result, a system of interdependent elements and actors is only as secure as its weakest link (*ibid*). Every actor will decide independently whether to invest in security or not; nevertheless, these individual decisions can have severe repercussions on overall system security. As the effectiveness of individual security investments is partly dependent on security investments of other agents, the decision to invest in security will depend on the expected actions of other agents. Consequently, without appropriate mechanisms to overcome possible coordination failures this situation can lead to sub-optimal levels of security when

actors – uncertain of the investment behaviour of others – decide not to invest in security (Kunreuther and Heal 2003).

A second disincentive to security provision is the partly public good nature of security; some investments into certain types of security will provide benefits to society at large, not just the entity investing in these actions. In contrast, other measures of security retain a private good element, which allow the investor to reap all returns from the investment. In the case of transnational terrorism, the public-private good dichotomy is most significant at the international level: protective policies aimed at securing a particular country, for example against al-Qaeda attacks, will benefit only this respective country and the people within its territory; proactive policies that target the actual terror threat in contrast incorporates positive externalities to other potential target countries who benefit from the reduced capacity of the terror organisation without action themselves. This free rider problem is -according to Enders and Sandler (2006) - a likely explanation why international actors are more inclined to rely on defensive rather than proactive policies when addressing transnational terrorism, even though as game theoretic models show, coordinated action could theoretically bestow higher benefits to all countries (*ibid*).

3.1.3 Terrorism

In this survey, terrorism will be defined as “the premeditated use or threat of use of extra-normal violence or brutality by sub-national groups to obtain a political, religious, or ideological objective through intimidation of a huge audience, usually not directly involved with the policymaking that the terrorists seek to influence” (Enders and Sandler, 2002:145). This definition has also been used by security economists in Europe such as Tavares (2004) and Brück (2006). Nevertheless, this definition has its shortcomings: first, it does not reflect the varieties of terrorism that have occurred in history and across countries (Hoffman 1998). Such aggregate definition runs the danger of masking the heterogeneity of terrorism and terrorists, their behaviour and consequently the impact. At the most basic, it is necessary to differentiate between large versus small scale attacks; continued versus protracted incidences; domestic versus trans-national terrorism.¹ This differentiation between different types of terrorism is critical as economic impacts of terrorism and the complexity of countermeasures

¹ Trans-national terrorism denotes an act of terrorism which involves actors and targets from at least two different nationalities. Actors could refer to either the terrorists themselves as well as to their wider support structure.

vary with the nature of the terror attack. Regarding the latter, trans-national terrorism involves the cooperation between at least two countries to tackle the causes and consequences of terrorism, and requires taking into account host and target country factors and their interactions that may drive terrorist activity.

Second, the above definition does not account for the political characteristics of the term terrorism: ultimately “every sovereign state reserves to itself the political and legal authority to define terrorism in the context of domestic and foreign affairs” (Alexander and Alexander, 2002: 1). As history shows, terrorists have become “freedom fighters” when power shifted hands. For the purpose of security economics this can have important repercussions for the reliability of data. Especially when data collection is based on government statistics acts might be defined as terrorist or other acts according to political suitability rather than “objective” criteria. In the context of the EU, the Council Framework Decision on combating terrorism of 13 June 2002 states that “the definition of terrorist offences should be approximated in all Member States, including those offences relating to terrorist groups” (Council Framework Decision (2002/475/JHA) §6) as suggested by the same document (Article 1 and 2).

3.1.4 Security economics

Security economics is understood as those activities affected by, preventing, dealing with and mitigating insecurity, including terrorism, in the economy. Such a broad definition includes private and public activities in both legal and illegal areas of the economy. Narrower versions of this definition (such as a focus on state spending for homeland security or private spending for anti-crime devices) may be adopted by other authors for different purposes (Brück, 2004: 376). Security economics further refers to the application of economic tools to analyse the origins and dynamics of (in-) security.

3.2 Data sources

3.2.1 Information collection activities

The survey is based on extensive and thorough research of the literature to evaluate the current level of understanding on the inter-relation between security and the economy. Building on the important recent works of Brück, Enders & Sandler, Frey and Tavares,

knowledge gained to-date has been assessed and gaps in the literature identified. To this end, an extensive list of references has been compiled using Google Scholar, Repec, EconLit, SSCI and electronic catalogues of major libraries in Europe and the United States, including academic literature (both theoretical and empirical) as well as policy and business reports.

3.2.2 Geographical scope of information gathering

The literature which has been reviewed for the purposes of this survey has been compiled irrespective of its country of origins to provide a global overview of the current state of research.

3.2.3 Key informants and stakeholders

The study builds on the knowledge and expertise of the project directors, advisors and staff as key informants. The members of the cross-European research team are established experts in the field of the economics of security with emphasis both on economic effects of terrorism and of anti-terrorism measures. They also contribute their expertise in advising national and international policy makers on antiterrorism policy from an economic point of view and on research policy concerning the economics of security. The DIW Berlin as a lead institution stands for high quality of economic research. Given the high policy relevance of the subject and of the study, the senior experts contributed to this project academically at reduced rates or without fees, thus, making the study extremely cost effective.

3.3 Research approach and methodological considerations

3.3.1 Research approach

Economic theory and applied economic analysis can contribute to the analysis of terrorism and its economic impacts and of security policies and their wider repercussions. The survey assesses the degree of available information on ultimate economic impacts reflected in macro-economic variables and impacts on specific sectors. Furthermore, it assesses how potential and actual terrorist events determine consumer and producer behaviour, public policy as well as terrorist responses to these policies. Apart from the impacts on the respective economic levels, distributional effects are analysed including the distribution of impacts between segments within an economy and between economies within the international economic

system. Theoretical aspects, empirical and policy work have been considered and key themes but also key methods and available data used in these studies have been identified. This will help design future European research policy in this field as the availability of data (or the lack thereof) will be a key determinant of what type of research and policy advice can be advanced.

Apart from analysing the literature a list of research centres and institute within the 27 member states of the European Union has been compiled which specialize on the economics of security or complementary research, focusing on the interplay between economy, terrorism and anti-terrorism measures. To assess EU research capacity, these institutions have been classified according to their main focus of research, their source of funding (private or public); their main activities (e.g. research, policy advice, teaching and networking). The main aim is to assess the degree to which these centres cover a) issues pertaining to security economics b) duplicate efforts or leaving gaps and c) whether there is sufficient creation of policy relevant information. To contextualise European research capacity, this list will be compared to a similar list containing major research centres in the US.

Many studies exist which provide overviews and summarise the impacts of terrorism, yet, these do not differentiate between various (temporal) stages of terrorist events and their repercussions: a) direct short run impacts triggered by an attack itself, b) the medium to longer term responses induced by fear and resulting security responses of agents, which c) will trigger reactions by terrorists. Most existing studies attribute the dynamic repercussions of terrorism to the terrorist event itself, even though the much of the economic repercussions are determined by the reactions of targets rather than terrorist actions. This distinction is critical as it provides a perspective on relative dimensions of the economic repercussions of the actual attacks versus the economic repercussion of response reactions, which at least in theory could be reduced through adequate management of a post- and pre-terror situation. In an attempt to reflect these different impact categories, the report is divided into three sections:

1. **The impacts of terrorist attacks** account for the economic repercussions to the economy from a risky event (Brück 2006) both at macro- and micro-economic level. These impacts correspond to the aftermath of an event, and deal with the immediate reaction of victims to a terrorist attack.

2. **The economic impacts of security measures** – or “costs of terrorism”² (*ibid*) - result from the responses of agents to re-establish an environment of security. Brück (2006) further differentiates between 1st and 2nd order effects; the first corresponding to impacts on private security spending and the second to policy reactions. Within the context of time, these activities occur between terrorist events, i.e. they are activities which attempt to prevent an attack altogether, or target to minimise the impacts and thus costs from an actual attack. These impacts do not only arise from public security policies but are also a result of changes in behaviour at individual level, which lead to a changed allocation of resources to consumption and production. Consequently, the ultimate impact of terrorism is not only determined by the nature of the terrorist attack but also by the reactions of the respective agents, leading to the hypothesis that impacts resulting from security reactions could outweigh the impacts of terrorist attacks themselves (Chen and Siems 2004; Brück 2006).
3. **The dynamic analysis of both terrorism attacks and security measures**, which recognises that terrorists’ behaviour will respond to both previous terrorist events and to security measures of public and private agents. These adjustments in behaviour (for example in the nature of attacks, or in the type of target) will in turn result in a changed aggregate impact of terrorist attacks. In other words, security responses do not only contribute to the total costs of a past terrorist event but also partly determine the economic repercussions of terrorism in the future.

The differentiation between the direct and indirect economic effects of terrorism is not always straightforward not least since most of the available literature has so far aggregated rather than differentiated between the two. Consequently, in some cases, no unambiguous classification is possible.

3.3.2 Other methodological considerations

There are at least four methodological problems associated with the evaluation of costs and benefits of terrorist events and anti-terrorist measures: a) the problem of double counting; b) the problem to value non-monetary parameters; c) the insufficiency of data; and d) general limitations of economics as discipline.

² Note here the difference between the specific terrorist attack and the reactions arising from a general fear of

Ad a) Double counting refers to the problem of accounting for the same costs or benefits twice, and arriving at an inflated figure of economic impacts. In the case of terrorism, aggregating the number of victims across different forms of terrorism (e.g. bombings, kidnappings, hijackings, etc) could lead to double counting if an event incorporate two or more of these different forms of terrorism (e.g. hijacking of a plane and its subsequent bombing), and the victims of this single event are accounted for under each type of activity separately.

Ad b) Non-monetary parameters refer to a value that has no market price equipment; a human life or life satisfaction for example have a value, which however is not readily quantifiable. It might also include more tangible economic parameters which are simply not traded in the market and therefore do not have as such a monetary value. Consequently, accounting for their value is often difficult. This issue is well known in natural resource economics and has been addressed in the field of security economics by for example Frey & Lüchinger in various publications. They argue that the economic impacts of terrorism are likely to be underestimated as non-monetary losses do not appear in statistical databases and are therefore not accounted for. There are various methodologies such as contingent valuation³ or hedonic market pricing⁴ which aim to overcome these problems but their application is not without limitations.

Ad c) As the understanding of terrorism and its impacts is based on reports on actual terror events in the media and by public statistics, the problem of “under-reporting” bias (the tendency not to report a specific event and therefore underestimating the frequency of terror) can significantly influence the accuracy of security economics. Leading economists conclude that extant research has fallen short from addressing this issue in a systematic fashion yet, underreporting is indeed present, implying that the used databases for terrorism represent an understatement of the true number of terrorist incidents (Drakos & Gofas, 2006).

Ad d) Even if economics can provide an additional dimension to evaluate policy choices, in many respects it cannot give clear cut answers to certain policy problems. Coughlin, Cohen et

terrorism.

³ Contingent valuation has been applied by for example Viscusi & Zeckhauser (2003).

⁴ The hedonic market approach is based on the idea that agents reveal their preferences regarding terrorism through for example. wage and salary demands and house / real estate prices. Yet, according to Frey and Lüchinger (2004) so far no studies exist which employ this methodology.

al. (2002) for example recognise that “economic theory does not provide a clear answer to what is likely to be a continuing source of controversy - the appropriate scope of governmental involvement in security”.

4 ECONOMICS OF INSECURITY – ECONOMIC EFFECTS OF TERRORIST ATTACKS

4.1 Existing studies and research

Direct economic impacts of terrorism refer to the effects arising from the immediate aftermath of a terrorist event. Estimating these impacts requires accounting for the physical destruction of buildings and infrastructure and losses of human life or capabilities (through injury) but also for the economic impacts resulting from actions to mitigate impacts. Further, in an inter-dependent economic system, economic impacts arise from the disruption of economic activities that terror attacks may cause, which imply that even economic entities which have not been direct targets of the attack are implicated by its effects. As this section will show, direct impacts of terror attacks vary depending on the nature and scale of the attack itself, the response reactions of economic agents but also on the maturity of the economic system itself.

4.1.1 Micro-economic impacts

Before assessing the aggregate impacts at the macro-economic level, micro-economic processes which determine the overall macro-economic effects need to be considered. At the most basic, it is possible to differentiate between three main types of economic actors, households or consumers, the private sector or producers and the public sector or governments. Depending on their involvement in the terrorist attack, they may suffer a) direct impacts through terrorism through both physical and human losses and b) indirect impacts as consequence of the disruption of the economy. At the same time, they themselves may influence the economy through their immediate responses to the violent shock that occurred. Thus, apart from the actual costs, it is necessary to understand the underlying processes and behaviour which lead to these impacts, all based on the notion that appropriate management of a post-attack situation could potentially mitigate negative impacts.

Direct economic losses of terrorism have reached new dimensions with the unprecedented magnitude of 9/11. Therefore it is not surprising that the core of the literature focuses on this event as a special case. The destruction that took place includes physical and human losses which far exceed the average scale of terrorist attacks: Human losses amounted to over 3,000 lives lost (including office workers, aircraft passengers and hundreds of rescue personnel),

excluding the unaccounted number of people who suffered temporary and permanent injury, who experienced health problems caused by the air pollution from the collapse of the buildings, not to mention the severe trauma and psychological impacts on victims and their families.

Various studies have attempted to compute the actual costs resulting from these losses. Estimated figures differ depending on whether human losses have been incorporated into the calculation and due to various accounting problems, such as differences in definitions of damage, measurement of losses used, aggregation issues, but especially the difficulty to value a human life, etc. (Brück and Wickström 2004). Overall the estimations of human and capital costs of 9/11 range between US\$ 25 – 60 billion. Navarro and Spence (2001) estimate that human capital losses alone account for US\$ 40 billion while property losses ranged “only” between US\$ 10 and 13 billion. This accords to Baily’s estimate (Baily 2001), yet is somewhat lower than the cost calculations of the OECD (Lenain, Bonturi et al. 2002). Furthermore, rescue and clean-up operations have been estimated at US\$ 11 billion (*ibid*). Of these aggregate costs, it has been estimated that 14 billion US accrued to the private sector, 1.5 billion US for state and local government enterprises, 0,7 billion US for the US federal government (*ibid*).

Yet, 9/11 is certainly an outlier with regards to the physical damage and human fatalities it caused in comparison to the majority of predominately nationalist separatist terrorist attacks that have been experienced in Europe. Apart from the scale two other key differences between 9/11 and “conventional” terror attacks prevail: first, recent trans-national terror attacks have been larger scale but single events, while most terrorism in Europe has employed small scale attacks on a more frequent basis; second, 9/11 hit targets which stand not only symbolically but factually at the centre of global economic activity (not only the New York’s business and financial centre but also the aviation industry) thus subsequently causing major economic disruptions, which are not likely to ensue from the destruction of a more politically strategic target.

a) Impacts at household level

No literature exists analysing the direct costs that households experience due to terrorist attacks itself, or due to subsequent disruptions of the economy (e.g. loss of employment). Nevertheless, some innovative approaches attempt to value the loss in life satisfaction and welfare that households experience due to the fear that acts of terrorism induce. As fear is

highly subjective it cannot easily be measured. Still, economic methods such as contingent valuation or the hedonic market approach can be employed to estimate the “price” of fear. Frey and Lüchinger (2005) and Frey, Lüchinger et al (2004, 2006) combine indicators of welfare (from the Euro Barometer) with three terror indicators to analyse the impacts of terrorism on micro-economic happiness in France, the Republic of Ireland and the UK. In all three countries, the estimations show that terrorist attacks have a statistically significant negative effect on reported life satisfaction. This decrease in life satisfaction is amongst other things reflected in the hypothetical willingness of people to pay for the reduction of terrorism in the three countries: a resident of Northern Ireland (with average household income) would be willing to pay around 38% of his income for a reduction in terrorist activity; residents in London would be willing to forego around 30% of their income; while residents of Paris would only be willing to pay around 13% of their income (Frey, Lüchinger et al. 2006).⁵

Ultimately, psychological factors such as fear and changes in life satisfaction and happiness can impact on economic behaviour. These non-monetary impacts can translate into significant monetary effects at household level but also in the macro-economy, when the psychological impacts of fear change consumption behaviour (Naor 2006), impact negatively on labour productivity or require medical treatment. While impacts of the latter two are not discussed in the literature, consumption effects due to changes in life satisfaction and utility have received some attention in economic research. Authors such as Eckstein and Tsiddon (2004) and Fielding (2003) show a marked decrease in consumption of non-durables related to changes in utility due to terrorism in Israel. Interestingly the immediate response to the attacks of 9/11 showed an increase in consumer confidence particularly reflected in the consumer demand for durables, which for example Enders and Sandler (2005) explain as being driven by “patriotism” that spurred consumption in an act of defiance against the attacks. Shieh, Chen et al. (2005) provide an alternative explanation for this increase, pointing out that given a terrorist attack is anticipated and the public fully informed short term consumption may deviate from its long-term level. Households may be motivated to increase the consumption of certain goods before an announced terrorist attack as a temporary response to a shortened

⁵ Beyond the impacts on “quality of life”, acts of terrorism can have severe psychological effects that become apparent in stress and trauma. Studies from Israel demonstrate these traumatic effects of terrorist attacks: children who have experienced a terrorist attack in their community show markedly higher levels of stress than children who “merely” live under the same threat of terrorism (Mansdorf & Weinberg (2003); Goldstein (2006) discovers signs for the traumatic impact of terrorist attacks in the 35% increase of fatal accidents after a terrorist attack in Israel.

lifespan. Thus, rather than relating the increase in consumption to the initial attacks on the World Trade Centre, the authors relate the increase in consumption to the expectation of future attacks which were announced by al-Qaeda and believed to be credible by the US Administration. However, in the long run Keyfitz (2004) shows that through their depressing effects on consumer confidence, “war jitters” and fears about weapons of mass destruction are estimated to have lowered (U.S.) consumption spending by 0.3 percent equivalent to a cumulative US\$ 40 billion over the past two years. This accords with Llussa and Tavares' (2006) conclusion that overall terrorism will decrease consumption.

Given these potentially significant economic impacts that the psychological effects of fear can trigger, approaches to contain fear and thus mitigate the impact of a terrorist attack need to be identified.⁶ Although the causes of fear are a psychological rather than an economic problem⁷, a small body of economic literature exists that attempts to shed light on some determinants of the fear caused by terrorism. One factor discussed in the literature is the phenomenon of “probability-neglect”. Research has produced evidence that people base their risk analysis on cognitive experiences of past events rather than actual probabilities of future events. In Kunreuther’s words, they employ the “availability heuristic” (Kunreuther 2002), which in the case of terrorism can lead to an over-estimation of high impact-low probability events such as a terrorist attack⁸, whereas the possibility of lower impact-higher probability events may be underestimated (e.g. car accidents). In other words, terrorism although less likely to implicate the ordinary citizen, will produce more fear than more probable risks (Downes-Le Guin & Hoffman 1993; Sunstein 2003; Viscusi & Zeckhauser 2003; Becker & Rubinstein 2004).⁹ As risk aversion and fear impact significantly on consumption in specific and economic behaviour in more general, more research is needed to identify how citizen’s fears can be contained.

⁶ In fact, as one of the objectives of terrorists is to cause fear, minimising fear after a terror attack, also implies minimising the actual benefits received by terrorists from their violent action.

⁷ The psychological impacts of terrorism have for example been discussed by Katiuscia, S., Galletto, V., and Blanzieri, E., (2003). “How Has the 9/11 Terrorist Attack Influenced Decision Making?” *Applied Cognitive Psychology* 17(9): 1113-27; and Pyszczynski, T., Sheldon Solomon and Jeff Greenberg (2003). *In the wake of 9/11: The psychology of terror*,. Washington, American Psychological Association.

⁸ Even in countries which experience sustained terrorist events such as Israel or the Basque Region death rates due to terrorism are very low: 0.01% and below (Naor, 2006).

⁹ These kinds of anomalies do not only occur with terrorism but also in other contexts of risk perception (Viscusi & Zeckhauser (2003).

b) Impacts on private sector

Businesses and firms have been direct and indirect victims to both domestic and trans-national terrorism for a long time. According to the US Department of State, US businesses constituted over 80% of terrorist attacks in 2000 and nearly 90% in 2001 (Michel-Kerjan & Pedell 2007). One of the reasons for this increase is that companies source from, operate in and supply to insecure countries, thus exposing themselves to greater likelihoods of terrorism; a second important reason are substitution effects of terrorists who shift their attention from better protected public buildings towards relatively easier to attack targets (*ibid*)

The actual impacts of direct losses depend on the characteristics of the company but mainly on the nature of the attack and its impacts which may include e.g. property damage or ransom payments for hostages. Overall, Enders & Sandler (2005) conclude that even if some sectors may face significant losses from terrorism, they are likely to recover quickly, given that the economy does not face sustained terrorist attacks.

While direct physical losses without doubt hurt companies, 9/11 has shown that it is disruptions in the interconnected economy which impact on businesses most severely. Even if businesses are not directly exposed to the physical destruction of a terrorist attack, terrorism can impact on companies through increasing their overall level of market risk, credit risk, operational risk and business volume risk. Furthermore, stock market reactions to a terrorist attack, partly induced by the fear to lose capital, partly based on speculative behaviour on future gains (or losses) of a company, can be detrimental to a company.

In this context, the danger of supply chain interruptions has received much attention in the literature. It has been estimated that business interruptions accounted for one third of the entire losses from 9/11 (Kleindorfer & Saad 2005). In general, companies experiencing supply chain disruptions under-perform their peers significantly in stock performance as well as in operating performance as reflected in costs, sales and profits (*ibid*).

This illustrates that it is not shocks on their own which create cataclysmic events but vulnerabilities of the economic system which determine the impacts of an exogenous shock such as a terrorist attack. These vulnerabilities may arise from actual technical factors (e.g. the physical inter-dependence on the economy through communication, transport, etc.) but also more elusive factors such as expectations on the functioning of the economic system: “longer paths and shorter clock speeds provide more opportunities for disruption and a smaller margin

for error” (*ibid*). Recent terror attacks such as 9/11 seem to have deliberately taken advantage of these vulnerabilities striking targets of economic significance which led to a break down of economic activity even beyond the immediate target area. In contrast, attacks on targets of “mere” symbolic or political value are less likely to cause disruptions beyond the actual geographical locality of the attack. This recognition is important in so far as reducing the economic impacts of terrorism should not only focus on the actual threat itself but has to take into consideration, to what extent the economic system while having become more resilient in certain respects has become more vulnerable in others (Kunreuther 2006) and whether these vulnerabilities can be minimised without compromising economic efficiency and effectiveness.

Apart from the direct and indirect disruptions, the private sector has to carry the burden of psychological impacts of terrorism; on the one hand, in their function as employers, on the other in their function as management decision makers being influenced by their own psychological reactions. As mentioned above, no rigorous analysis beyond anecdotal evidence exists that elicits the impacts of fear of employees on the private sector. The case of the bombings of the London public transport system on July 7th, 2005 shows that it could be significant. Some firms reported that they had to find alternative means of transport for their employees unwilling to use public transport into central London. For smaller firms this even constituted the principal cost of the attack (London Chamber of Commerce, 2005). But it remains unknown how significant these impacts are for the cost structure of companies or for labour productivity.

The available literature how terrorism impacts on management decisions will be reviewed in Section 5.1.1 below.

c) Impacts on public policy / public sector

Apart from households or consumers and the private sector, the public sector is the third economic agent, who is directly and indirectly affected by terrorism. There is scant explicit literature on the direct economic impacts that terror inflicts on governments. While an estimate of the costs to the US government arising from 9/11 has been given above, the costs

arising from physical destruction from smaller scale terror attacks in general are not estimated but they are likely to be relatively small.¹⁰

Yet, potentially more significant, public sector policies before and after a terror attack are critical to contain and mitigate the economic impacts of a terrorist attack, restore order and confidence in the economy. Necessary policies can be differentiated according to their timing: on the one hand, governments have to build their emergency response preparedness before an attack; on the other hand, they have to institute appropriate short run policies in response to an actual terror event.

With regards to the first, health sector policies are particularly important to mitigate the impacts of terrorism. Any large-scale terror attacks will put the public health infrastructure to the test, having to deal not only with mass casualties resulting from the event, but also the longer term impacts of physically and psychologically incapacitated victims. Organizing an effective response challenges government institutions because the issues involved -eligibility for health care, the effects of low-level exposure to toxic agents, stress-related illnesses, unlicensed therapeutics, financial compensation, etc- are complex and controversial (Hyams, Murphy et al. 2002). Aggravating although the use of biological and chemical weapons as agents of warfare and terrorism has so far only occurred sporadically¹¹, recent events demonstrate the increasing risk and possibility that terrorist groups may employ them against civilian targets, as was demonstrated by the release of anthrax in the United States. It is expected that agents such as *Bacillus anthracis* and *Yersinia pestis* could leave hundreds of thousands dead or incapacitated (Evans, Crutcher et al. 2002). The impact of the attack will depend on a number of variables, including the agent used, method of dispersal, but especially preparedness of the public health system to respond appropriately. Contingency planning so far almost exclusively involved detection, containment, and emergency health care for mass casualties. However, it is clear that even small-scale CBN incidents, like the spread of anthrax spores through the mail, can cause widespread confusion, fear, and psychological stress that have lasting effects on the health of affected communities and on a nation's sense of well-being (*ibid*).

¹⁰ These costs arise whenever public infrastructure or buildings are destroyed in a terrorist attack, which can vary from government buildings, publicly organised transport and services infrastructure but also military structures and equipment.

¹¹ One widely known incidence of a biological terrorist attack was the dispersion of sarin gas in the subway of Tokyo in 1995.

Even though the preparedness and structure of the public health sector appears to play a significant role in mitigating the short and long term economic effects of a terror attack, so far it has received little attention in the security economics literature. The only contribution which was found in this respect is a statistical model assessing the effectiveness of the antibiotic prophylaxis that 10,000 people received in the United States to prevent a further spread of anthrax. This study concludes that in the absence of the medical intervention, the outbreak could have been about twice as large but it is unlikely to have exceeded 50 cases” (Brookmeyer & Blades, 2003).

Neither the costs resulting from specific attacks nor the costs of different policy responses have been accounted for.

Preparedness to tackle the impacts of a terror attack is only one side of the coin. The right response reactions especially through economic policy are critical to restore confidence into the economy and thus minimise the negative economic impacts of a terror attack.¹² Still, there is little rigorous analysis of appropriate monetary and fiscal responses to mitigate the economic impacts of terrorism. Baily (2001) in a policy report, outlines and comments briefly on US fiscal policies responding to the impacts of 9/11. These policy measures included the enactment of tax cuts, distribution of rebate, the discussion of a tax stimulus package and the approval of an amount of US\$ 40 billion by Congress for emergency spending measures that included military and security spending as well as reconstruction. Furthermore, the aviation industry was granted support to the amount of US 15 billion. He also provides an overview of US monetary policies which followed the 9/11 attacks. Central to containing the shocks of the attack was the liquidity that the Federal Reserve Bank¹³ and the European Central Bank added to the system thus allowing cash strapped banks to borrow money more easily. Second, a 0.5% point cut in interest rates stimulated spending. Lacker (2004) confirms these findings, reviewing the monetary and payment system consequences, highlighting that the relatively benign banking conditions helped to make the Fed’s credit policy manageable. Based on Lacker’s report and a general overview of the existing literature conclude that the US’s fiscal

¹² The London Chamber of Commerce in its report on the economic effects of terrorism on London points out that even though the attacks on the London public transport system on July 7th, 2005 caused relatively little destruction it significantly decreased the confidence of the business community in the economy (London Chamber of Commerce, 2005)

¹³ After September 11, 2001, the Federal Reserve injected more than \$ 100 billion in additional liquidity.

and monetary policy responses were critical in attenuating potentially even worse economic effects of the terrorist attack (Llusa & Tavares, 2006).

4.1.2 Impacts across sectors

Terrorism impacts differently across various economic sectors. Impacts differ depending on the nature of the attack and its target, whether a sector is directly hit or whether its activities are “merely” interrupted by the disruptions that a terrorist attack may cause. With respect to the first, the tourism sector has been a frequent target of terrorism. No analysis exists on the economic impacts that direct effects of terrorism have on the tourism industry. Rather the literature concentrates on the analysis of changes in demand structures as the predominant economic impact of terrorism on the tourism industry which will be discussed later in the report.

The transport sector (aviation, maritime transport, road and railways) has been another direct target of terrorist attacks, reflected for example in the attacks of 9/11, and the subsequent acts in Europe.¹⁴ The aviation industry has been particularly conducive to terrorists. In the specific case of 9/11, the aviation industry is said to have “lost more in one year than it had made in its entire history” (IATA Director General and CEO Pierre J. Jeannot)¹⁵ first, due to the incurred physical losses of four airplanes, second, due to subsequent airport closures and disruptions in services, thirdly, due to the negative impacts on the value of airline stocks and fourthly due to changes in passenger and cargo demand patterns for air transport (Drakos 2004), which will be discussed in section 5.1.2 below.

Even sectors who are not directly implicated in a terrorist attack can suffer under the consequences of the disruption of the economy. Especially attacks on the transport sector can lead to severe delays in the movement of goods and services which have been discussed as “supply chain disruptions” above. The scale of the impact and which sectors will be affected will be determined by the nature of the attack and the target. Once again 9/11 represents an unprecedented outlier that caused severe disruptions across a wide range of sectors hitting a globally significant economic hub. In contrast, even though severe the subsequent bombings

¹⁴ These attacks include the Madrid train bombings, the attacks on the London public transport system and the unsuccessful attempts to bomb commuter trains in Germany.

¹⁵ This statement was made during the opening day of the Airline Financial Summit, New York City, 8 April, 2002 (quoted in Drakos (2004)).

in London and Madrid did hardly cause any disruptions even in the local economy (London Chamber of Commerce, 2005).

Until today, especially the direct impacts on terrorism have been confined to a relatively small set of sectors. This however, does not mean that there are not other sectors which could potentially become targets of terrorism in the future. The agricultural sector for example has been identified by some as potentially attractive to terrorists, with possibly detrimental effects not only on the sector itself but also society at large (Chalk 2001). Yet the actual degree of risk is contested (Blandford 2002). Even if these policy reports constitute the informed opinion of policy advocacy coalitions rather than scientific papers, the lesson that should be drawn is that terrorism could provide surprises by aiming at previously unthinkable targets.

Within the sectors affected by terrorism, the insurance sector plays a somewhat special role as it neither experiences destruction directly nor is negatively affected by disruptions of the economy, but suffers under the consequences of terrorism through ensuing payment claims. While insurance companies are able to cover small terror attacks such as sporadic bombings with localised impacts, 9/11 dealt a particular blow to the insurance and re-insurance industry, first due to claims at the scale of billions of dollars and second due to negative impacts on stock markets which affected the capital base of insurance companies. Consequently, 9/11 triggered important changes in the insurance market. The main problem that 9/11 posed, was the number and the volume of simultaneous claims, which exceeded the capital insurance companies held (Alexander and Alexander 2002). Claims to insurance companies related to 9/11 totalled US\$ 50 to 80 billion which was partly paid by primary insurers partly by re-insurances. Importantly, while the tragedy of 9/11 unfolded in the United States, much of the costs (in total an estimated US\$ 1.3 billion) were carried by European insurance companies (*ibid*). With 9/11, the insurance industry realised that terrorism has reached a new scale that does not comply with conventional insurability criteria: since 9/11 it is difficult to measure the risks associated with terrorism, which renders it next to impossible to calculate insurance premiums accurately (Cummins 2002; Hogarth 2002; Wolgast 2002; Caplan 2003; Cummins 2003; Ericson & Doyle 2004; Dixon & Reville 2005). In practice, the insurance sector reacted first with raising premiums drastically (between 50-100%) which hit particularly shipping and

transport companies (airlines)¹⁶ (Walkenhorst & Dihel 2002) and owners of large commercial property. As the “unimaginable” had happened and led to an unquantifiable risk, insurance companies second, announced the exclusion of terrorism coverage unless government support was granted. Intervention of the government in the insurance market, which under normal conditions runs counter liberal market philosophies, has therefore received much attention in the literature: the literature analysing different government interventions in the insurance market across countries concludes that the case of terrorism may represent an instance where public intervention and even subsidies are necessary for maintaining some market forces, rather than using regulation (or the lack thereof as was common in most OECD economies before 9/11) to stifle the market for terror insurance (Brown 2002; Russell 2002; Brown, Cummins et al. 2004; Chalk 2005; Janusz 2005).

While in general, terrorist attacks are associated to incur costs and losses across sectors, a few sectors may in fact benefit from attacks. Berrebi & Klor (2005) assess impacts of terrorist attacks during the second intifada on the stock value of Israeli companies differentiating between security and non-security industries.¹⁷ They find that terror attacks had a significant negative impact of 5% on non-defence related companies, in contrast to a significantly positive effect of 7% on defence and security related companies. These coefficients translate into an average loss of US\$ 65 million in the market capitalization of non defence-related companies, and an average increase of US\$ 53 million in the market capitalization of defence related companies, induced by expected increased demand of stock traders.

4.1.3 Impacts on financial markets

The large scale impacts of various financial crises in the last century have highlighted the significance of financial markets in the economy. Exogenous shocks such as terrorist events are generally expected to impact negatively on financial market values. Once again, 9/11 takes a special place within the literature, yet it is necessary to differentiate the impacts of this singular large scale event from impacts of protracted terrorism such as in Israel and Spain (Basque country).

¹⁶ Airlines faced an increase of insurance premiums by up to 400%, yet, this was buffered thanks to the airline stabilisation legislation which allows for the federal government to pay any rise in commercial insurance (Alexander & Alexander, 2002).

¹⁷ Stock market values are a good indicator for the actual economic damage of a terrorist attack, as they provide information on the expected impacts on future returns and risk perception, given that the speculative element on the behaviour of others is kept in mind (Frey, Lüchinger, et al (2004).

Chen and Siems (2004) who study the impacts of terrorist events on the US capital market in comparison to other military attacks¹⁸, show that the latter led to substantial negative cumulative returns. In contrast, the event of terrorist bombing attacks¹⁹ produced no abnormal returns on the day of the attack. The only terrorist attack with a significant impact was 9/11: even after six trading days markets showed negative cumulative abnormal returns. Nonetheless, they conclude that the magnitude of the shocks were even if significant, still not without precedent in history, i.e. the reaction to the attack was less severe than reactions to previous shocks. In accordance with others (e.g. Enders and Sandler 2005; Enders and Sandler 2005; Brück 2006; Llussa and Tavares 2006), they conclude that the contained shock of the financial and stock markets are largely due to increased resilience of US capital markets to exogenous shocks.

In comparison, protracted events in smaller markets can have significant impacts as illustrated by Eldor & Melnick's (2004) study of the impacts of the Israeli capital markets. Analysing the impacts of terrorist attacks on stock and foreign exchange markets in Israel (1990 – 2003), they find that suicide attacks have permanent impacts on both markets, while other type of attacks do not; overall, the Israeli Palestinian conflict reduced the stock market capitalization substantially. Interestingly, they find that even after continued experiences with the Palestinian-Israeli conflict the stock market still reacts to suicide bombings, which may be explained by the fact that stock purchases are not just based on the expectation of the future value of the firm but also on the expected behaviour of others. Accordingly, Abadie & Gardeazabal (2003) show this negative relation between terrorism and stock market values in the case of the Basque country: With the announcement of the cease fire, Basque stocks outperformed non-Basque stocks, while at the end of the cease fire, Basque stocks showed a negative performance.

In summary, while the impacts of a large-scale singular event in a comparatively well diversified capital and stock market may be relatively short lived and small (Llussa and Tavares 2006) the impact of protracted terror events, even if smaller in scale in relatively less diversified markets may create lasting negative impacts.

¹⁸ These military attacks include the invasion of France (1940) or North Korea (1950).

¹⁹ The terrorist attacks incorporate are the bombing of Pan Am (December 21, 1988), the World Trade Center (February 26, 1993), Oklahoma City (April 19, 1995) or the US Embassy in Kenya (August 7, 1998).

4.1.4 Macro-economic impacts

While a micro-economic analysis provides a disaggregate account of the impacts of terror on different agents and elements of the economy, an aggregate analysis identifying the impacts on various macro-economic variables sheds light on the repercussions of terrorism on the overall state of the economy. In this context, the literature focuses on two key variables to show the direct impacts of terror attacks, namely economic growth and trade.

a) Growth

The literature in general finds that impacts of terrorist attacks on growth are short-lived. It is estimated that 9/11 caused losses in US productivity amounting to US\$ 35 billion, 47 billion in total output and a rise in unemployment by almost 1% in the following quarter (Sandler and Enders 2004). Still, overall these impacts appear to have had relatively little significance for the US economy thanks not only to the latter's size and maturity but also due to prudent government policies which have been outlined above (*ibid*).²⁰

9/11 is an outlier compared to repercussions that more frequent smaller scale attacks incur especially when they happen in less diversified economies than the United States. The impacts of terrorism on the economies of Spain (especially the Basque country) and Israel have been studied in depth and provide illustrative examples. Both case studies show the negative impact that terror attacks can have on small scale economies, especially when these attacks are not single events but continue over a longer period of time. In the case of Spain, Abadie & Gardeazabal (2003) estimate the overall economic effects of terror in the Basque Country²¹: after the outbreak of the ETA-campaign in 1975, GDP per capita declined about 12 percentage points relative to the synthetic control region in the late 1970's and about 10 percentage points during the 1980's and 1990's. In the case of Israel, Eckstein and Tsiddon (2004) estimate that Israel's per capita output could be 10% higher in 2004, had Israel not suffered under terror in the preceding three years. The negative relation between terrorist attacks and growth of these two case studies are confirmed at a more general level by Blomberg, Hess et al. (2004). Employing a cross country regression with observations from

²⁰ It is methodologically difficult to clearly relate growth dynamics to terrorism given that the US economy was already facing a recession (Enders & Sandler, 2005). In more general words, the problem to assess impacts lies in the missing counterfactual as it is unknown how an economy would have developed without the terrorist attack (Frey & Lüchinger, 2004).

177 countries between 1968 and 2000, they find that terrorism depresses economies significantly. Importantly, the effect of terrorism is smaller and less persistent than the economic impacts of conflict.

To contextualise these impacts, Tavares (2004) compares the scale of different shocks, namely terrorist campaigns, natural disasters and financial crises: he finds that terrorist attacks on civilian and military targets (as opposed to e.g. public or government buildings) are the most detrimental, leading to potential decreases in GDP growth of up to 0.25% points. In comparison natural disasters have negative and significant impacts, currency crises negative and very significant impacts on GDP growth. When standard growth variables are included into the analysis terrorism shows in fact no influence on growth. In sum, after taking into account additional determinants of income growth²², he concludes that natural disasters and currency crises impact on growth, but not terrorism. Similarly, the economic effects of terrorism on growth are smaller and less persistent than the economic impacts of conflict (Blomberg, Hess et al. (2004)).

Even local economies appear to be able to recover quickly given a certain degree of economic maturity. Especially cities and urban areas have been frequent targets of terrorist attacks. In theory, terrorism influences settlement patterns and urban areas through a) the safe-harbour effect, b) the target-effect and c) the transportation effect (Brück 2006). Terrorism could therefore be conceptualised as “tax” on cities (Llusa and Tavares 2006). The general consensus of the literature on war and cities in the 20th century shows that especially in the long-run costs to cities due to destruction are relatively low (Eisinger 2004; Brück 2006; Llusa & Tavares 2006), with however exceptions of certain extreme events (Glaeser & Shapiro 2001). Even in the large scale even of 9/11, Bram (2002) concludes that “although New York City clearly suffered a severe blow from the attack, the major disruptions appear to have been short-lived and conditions are in place to begin a recovery” already in 2002.

²¹ The authors construct a “synthetic” control region to overcome the problem of the counterfactual, using a combination of other Spanish regions that resembles the Basque Country before the onset of the terrorism campaign.

²² These determinants include the country’s population—to control for scale effects—, the degree of trade openness, the rate of inflation, the share of primary goods exports in merchandise exports, the size of government measured as the share of government spending in GDP and the share of government spending in education. These variables capture most of the economic indicators shown to be associated with economic growth in cross-country growth empirics.

To conclude, macro-economic consequences of terrorism events are generally modest and of short-term nature, especially in large and diversified economies that are better able to withstand severe economic impacts through their ability to quickly reallocate capital and labour, given the immediate effects are localised. In contrast, the macro-economic effects of terrorism attacks for small less developed economies are likely to be much more significant. Especially when these face sustained campaigns over a number of years, decreases in per capita GDP are probable (Llusa and Tavares 2006).

b) Trade

The second macro-economic variable that receives attention in the literature is international trade. Terrorism impacts directly on trade when traded goods and infrastructure become targets themselves²³, or when an increased level of insecurity stalls trade between countries. Further negative impacts arise from increased security measures at for example border posts or important transport hubs, which will be discussed in Section 5. Quantifications of the trade impact are provided by for example Nitsch & Schumacher (2004) who assess the impact of terrorism on trade between more than 200 countries for the period 1968 to 1979. According to their results, countries targeted by terrorism trade significantly less with each other than countries not affected by terrorism. Moreover, the effect is economically large: a doubling of terrorist events in a trading partner's country is estimated to reduce international trade by 4% (*ibid*). Blomberg and Hess (2005) calculate that, for a given year, the presence of terrorism, as well as internal and external conflict is equivalent to as much as a 30 percent tariff on trade. This is larger than estimated tariff-equivalent costs of border and language barriers and tariff-equivalent reduction through GSPs and participation in the World Trade Organisation. In general, the literature agrees that flows of international trade are negatively affected by terrorism events (Llusa and Tavares 2006).

4.1.5 The determinants of the economic impacts of terrorist attacks

The above section has shown that the economic impacts of terrorist attacks are determined by a number of factors, which can be classified into three broad categories: the nature and

²³ Attacks on trade infrastructure include for example the repeated attacks on oil pipelines in Iraq after the fall of Saddam Hussein, which temporarily paralyzed oil exports; or the attack launched on the French super tanker "Limburg" off Yemen's coast in October 2002 (Frey & Lüchinger, 2004).

characteristics of terror; the degree to which impacts are mitigated; and the maturity of the economy.

As has been argued above, terrorist attacks differ in the degree to which they harm an economy depending on some key dimensions including a) the severity of the attack (which influences the extent of physical damage); b) the frequency of the attacks which results not only in the accumulation of direct losses but also in changes in the behaviour of agents; c) the target and its direct relevance to the economy, i.e. an attack on a government building, while costly, is likely to disrupt economic activity less than an attack on any critical infrastructure.

The consequent questions are whether terrorist attacks have become more frequent and whether its scale has increased and thus whether terrorist attacks have become more severe and therefore more costly. Regarding the first, the literature agrees that accounting for the cyclical nature of terrorism (Sandler and Enders 2004), overall, there is no increasing trend in incidences of terrorism. Still there is an open discussion in the literature: Frey and Lüchinger (2002) contend that terrorism incidences have decreased since the mid-1990s, while for example Bellany (2007) argues that there is no visible trend at all.

Regarding the second question, there is agreement that the severity of incidences has increased (Frey and Lüchinger 2002; Enders and Sandler 2005; Human Security Centre 2006; Bellany 2007). Enders and Sandler (2002) find that an act of terrorism is about 17% more likely to result in casualties compared to the 1970s, which can be explained by the increased incidence of bombings in the proportion of deadly incidents, (as compared to hostage takings, assassinations), the high proportion of mostly crowded civilian targets²⁴ and the rise of suicide attacks, which have a higher average rate of fatalities. Regarding the distribution of terror attacks a shift of incidences of terrorism towards the Middle East, the Persian Gulf and to a lesser degree South Asia has been recorded. Collectively these regions carry the main burden of international terrorism (Human Security Centre 2005; Coolsaet & Van de Voorde 2006; Enders & Sandler 2006). However, it is surely true that Europe and the United States even if not experiencing a higher frequency surely suffer under an increased severity of terrorism, not least as suicide attacks that are on average more deadly than other incidences, until 9/11 were unconceivable (very much in contrast to countries such as Israel).

²⁴ These types of attacks account for more than half of all terrorist attacks (Tavares, 2005).

The nature of the attack is not the only factor that determines the actual impacts. The economic impacts of terrorism are partly determined by the structure of the economic system itself, as argued above and summarised succinctly by Enders and Sandler (2005). The case of 9/11 is illustrative for the resilience of a mature, well diversified economy to a large-scale shock. Even if the al-Qaeda's attack caused large scale destruction and disruption of even geographically remote economic activity, the economic impacts on the US and the global economy remained transitory. In contrast, only two terrorist attacks in Yemen dealt a severe blow to its economy which was largely based on its importance as shipping port.²⁵ This illustrates the importance of size and diversity of an economy to enable it to absorb shocks (*ibid*). Little attention has so far been paid on how terrorism impacts on small and less developed economies. Blomberg, Hess et al. (2004) provide some insights confirming the above, yet, these are not sufficient according to Enders & Sandler (2005) to provide an adequate picture. Drawing inferences from the factors that stabilise economies, one can conclude that developing countries are likely to suffer more under terrorism due to a) limited institutional abilities b) small and often fragmented markets c) policy inflexibility in the case of high debt burdens.

Beyond economic factors, Tavares (2004) interestingly points out that the prevalence of democratic freedoms and rights may act stabilising, even if not in terms of the occurrence of acts of terrorism²⁶, at least in terms of reducing economic costs. In other words, his research shows that democracies are better able to withstand even a severe terrorist incidence.

Yet, while the maturity of an economy is important to withstand a terror attack, it is not a sufficient condition. As pointed out in the literature, appropriate response reactions, particularly government policies are important to contain the escalation of negative repercussions. This, first, is determined at a technical level by the country's ability to provide relief and manage emergency and rescue actions effectively. This is similar to a natural disaster where a country's emergency preparedness is crucial in containing costs. Although not discussed explicitly in the literature, anecdotal evidence claims that the preparedness of

²⁵ In 2000, a US ship was hit by a terrorist attack while refuelling in Yemen's shipping port. This incidence was followed in 2002 by a terrorist attack against a French tanker. Even though Yemen's port had a comparative advantage due to its location, these two incidences led to the collapse of Yemen's shipping industry as shipping activities were relocated to neighbouring ports. This had severe negative repercussions on Yemen's overall economy, which is largely dependent on its transport hub.

²⁶ As will be shown in Section IV.3, the relation between democracies and the occurrence of terrorism is contested.

households and private individuals is critical to support relief efforts and mitigate damage.²⁷ Related to this, but also related to general economic activity is the preparedness of service providers especially of critical infrastructure to remain operational in the event of an emergency and therefore to contain the disruption in economic activity which leads to the escalation of impacts. Apart from the direct technicalities of emergency response, the ability of government institutions to apply appropriate monetary and fiscal policies and restore confidence into the economy form crucial part to mitigate impacts. It has been widely argued that well-orchestrated macroeconomic policies cushioned the blows of 9/11 (Chen and Siems 2004; Enders and Sandler 2005).

4.2 Limitations in the existing literature

Significant insights have been generated not only since 9/11 but already before about the economic impacts of terrorism across a wide range of issues. Still, a number of significant knowledge gaps remain with respect to the micro- and macro-economic analysis of the impacts of terrorist attacks.

4.2.1 Micro-economic impacts

Most of the knowledge generated to shed light on the economic impacts of terrorism focuses on impacts at aggregated level and specific business sectors. Relatively little information has been generated on the economic repercussions of terrorist attacks at household level. While a few single events may not cause large interruptions, the section above has shown that protracted terrorism can have significant economic implications, especially for small economies.

Yet, no information exists how these costs are then distributed within the economy, and to what extent household income streams, and consequently, savings and consumption behaviour will be affected. Furthermore, there is also little understanding on the economic impacts of psychological traumas of victims and their families, which may incorporate higher spending on medical bills, absenteeism at work, and a reduction in labour productivity, not to mention the reduction in welfare and life satisfaction that households may suffer. Other

²⁷ This has been suggested by for example R. Ackermann, vice-president of the International Association of Fire and Rescue Services CTIF in his presentation at the European Security Research Conference SCR '07, March 26-27th, 2007, in Berlin.

disciplines have studied the psychological impacts of terrorism, economics could add in quantifying the significance of these impacts at the micro- and macro-level.

With regards to the private sector, economic analysis has focused on those sectors and industries that have experienced negative impacts of terrorism in the past at the expense of sectors that may be vulnerable to terror attacks in the future.

The importance of the public sector to mitigate impacts of terror has also received too little analysis. As 9/11 shows, appropriate fiscal and monetary policies were key in ameliorating the worst economic impacts. Yet, no rigorous and generalised analysis appears to exist that could extract best practices for replication in the case of a similar event. Beyond direct economic policies, approaches to contain and manage citizens' fears appear to be of significant importance, yet again little is known on possible actions. Apart from fiscal and monetary policy, public preparedness to adequately respond to a terrorism attack has received too little attention in the literature. Most importantly, even though the health sector plays a significant role in mitigating the impacts of a terrorist attack in the short and long run, it has so far been largely neglected in the analysis. Somewhat related to this, is the omission of emergency response and rescue teams from the economic analysis.

4.2.2 Macro-economic impacts

Given the gaps within micro-economic analysis, congruent gaps in the macro-economic analysis arise. First and foremost, no analysis exists on the impacts of terrorism aggregate labour productivity resulting from psychological and physical effects on the workforce.

Further, so far formal studies have mostly concentrated on the economic impacts on industrialised economies. Apart from Blomberg, Hess et al. (2004) aggregate comparison and a few single case studies little is known, how terrorism impacts on the economies of developing countries. Yet, as the statistics show, even though large scale attacks are mainly aimed at industrialised countries, most actual attacks in fact happen neither in the US nor Europe but rather in other regions, specifically the Middle East, and South East Asia, i.e. in small and relatively less developed economies.

When studying the economic impacts of terrorism on developing countries a second issue becomes salient that has so far been overlooked: the economic impacts of terror organisations in host countries or regions (in the case of national terrorism): In Palestine for example

Hamas, which is labelled a terrorist organization by Israel, the United States and Europe, is also a major provider in the health sector of Gaza and the West Bank. This gains Hamas not only legitimacy and political support (Hilsenrath 2005) but should have a clear impact on the economy. These aspects of terror are surely not only relevant for Palestine but in other situations and countries, yet, no formal studies exist on the economic importance of underlying terror activities in contrast to actual terror acts.

Very limited knowledge is available regarding, spill-over impacts of terrorism on neighbouring countries, be they in the developed or developing world. Especially in the context of the economic area of the EU, it would be beneficial to know how terrorism in one member state impacts on others, and in return to what extent EU integration is strengthening the resilience of national economies and the EU economy as a whole.

Ultimately, it is not known what the next terror attack is going to be. Given this uncertainty, the need to identify how costs of terrorist attacks can be reduced through public and private preparedness and cooperation becomes even more relevant. What is currently not understood is how significant appropriate emergency responses across all levels are to minimise the economic impacts of terrorist events and prevent an escalation.

Overall, in order to identify strategies to mitigate the impacts of terrorism, terrorism should not be studied in isolation but potential synergies should be identified that buffer economies against a variety of shocks from different security threats. Following forms of interrelations could be of interest: first, the similarities and differences of security threats regarding their economic impact (nature and scale of this impact) and second, potential synergies to mitigate these threats.

5 ECONOMIC EFFECTS OF ANTI-TERRORISM MEASURES

The economic impacts of anti-terror measures have been classified as the “costs of terrorism” which result from the actions of both public and private agents to protect themselves against the impact of a terrorist attack or to prevent a terrorist attack altogether (Brück 2006). Estimating these economic impacts requires accounting for direct effects, resulting from the expenditures invested in security measures and indirect impacts which derive on the one hand from the opportunity costs of these security investments and on the other from dynamic effects of externalities and spill over effects. Lastly, the economic impacts of security measures should further account for their actual impact on terror behaviour or the effectiveness of the chosen security measures.

Two broad classifications of security measures can be identified in the literature: Enders and Sandler (2006) differentiate between defensive and pro-active security measures: the first broadly concentrate on protecting targets from attacks or mitigating the impacts in case of attack; the latter concentrate on fighting the threat itself, i.e. target terrorists and terror organisations in an attempt to undermine their capacity and activities by reducing their resource base.

Frey (2004) in turn classifies security measures not with respect to their object of focus (targets versus terrorists) but rather with regards to the adopted approach. He identifies “deterrence” in contrast to “positive” or benevolent measures: the first incorporate both “physical” as well as legal measures aiming to deter terrorists from their activities; the second, in reverse point towards measures to create incentives which induce terrorists to replace their acts of political violence with non-violent means.

Importantly, these classifications are not mutually exclusive, i.e. they do not provide alternative but complementary classifications as illustrated in Table 5-1 below.

In practice, defensive measures entail direct actions such as investments in security technologies, and indirect actions including changes in consumption, investment and saving patterns to avoid exposure to risk situations.

“Pro-active measures” on the other hand, incorporate all measures that aim to undermine terrorist activity, directly through interrupting their supply of resources including financial

assets, arms, recruits etc; measures can range from intelligence operations, to military strikes (e.g. Iraq and Afghanistan) (Enders and Sandler 2006).

Table 5-1
Classification of different types of counter-terror measures

	Defensive policies	Pro-active policies
Deterrence policies / negative incentives	<u>Increasing the costs of terror</u> e.g. surveillance & protection of targets	<u>Decreasing resource endowments of terror organisations</u> e.g. intelligence and military operations
Benevolent policies / positive incentives	<u>Decreasing the benefits derived:</u> e.g. decentralisation of targets, decreasing media attention	<u>Increasing opportunity costs of terrorism,</u> e.g. tackling grievances /root causes of terrorism, re-socialisation programmes

Within these two broad categories, it is possible to identify two sub-categories: defensive measures can be differentiated whether they protect singular identified targets or whether they attempt to mitigate the impacts of an actual terrorist attack; pro-active measures can be differentiated whether they merely target the symptoms or the root causes of terrorism, i.e. the underlying grievances, structural and systemic fault lines which necessitate actors to employ violent forms to express political opinions.

The economic literature explains the choice of counter-terrorism measures (especially in the case of trans-national terrorism) mainly based on the public-private good nature of security. Defensive policies are largely a private good, where benefits of security provision are mostly internalised by the investor, while pro-active policies exhibit characteristics of a public good (Sandler and Siqueira 2006). Game-theoretic approaches show, that given the absence of coordination mechanisms that ensures all to take proactive measures, countries will be better off to take defensive measures and free ride on the pro-active measures of others in the cases of trans-national terrorism. This consequently may lead to an oversupply of defensive and an undersupply of pro-active measures (*ibid*).

The public-private good nature of security provision increases the need for cooperation at the international level between countries and at national level between the private and public

sector. The main obstacle herein lies in how to overcome persistent coordination failures between different agents to ensure their compliance. Sandler & Siqueira (2006) conclude that leadership is apt to lessen inefficiency in providing defensive measures, yet fails to improve efficiency for pre-emptive measures.

When considering the factors that induce or prevent cooperation to enhance security, incentives not to provide security should not be overlooked. Several states (often so called “failed” states) are known to tolerate the activities of terrorist organisations in their territory in exchange for no direct harm at the expense of other nations, which is referred to as “paid riding” by Lee (1988). These counterproductive activities make multilateral cooperation even more important (Llusa and Tavares 2006), yet, as the practice shows, not easier (Enders and Sandler 2006).

5.1 Existing studies and research

The literature on the economic repercussions of security measures is scant and little definite conclusions can be drawn. Still, it is possible to show that the economic repercussions of countermeasures will vary greatly depending on which measures are adopted and how, by whom and in which economic context they are implemented.

5.1.1 Micro-economic impacts

Just as in the section above, the underlying micro-economic processes are explained before the aggregate impacts at the macro-economic level are analysed. At micro-economic level, security measures of economic agents can include direct expenditures on security technologies or indirect changes in consumption and investment behaviour to hedge against the risk of falling victim of a terror attack; in addition, dynamic impacts of these changed consumption and investment patterns have to be accounted for.

a) Security measures of consumers and households

Sound research on measures of households to enhance levels of security hardly exists, even after the incidences of 9/11. Consequently, not much more information is available than anecdotal evidence such as accounts of panic purchases of antibiotics following the anthrax scares in the US in 2001. In contrast, a few very localised studies - summarised by West and Orr (2005) – suggest that the American public’s security measures are far less drastic than

these anecdotes suggest: For example, a 2004 New York Times national survey revealed that households have hardly taken action to prepare themselves for a terrorist attack: 61% of the respondents had not put together an emergency food kit with water, and 70% stated that they had not chosen a family meeting place or communications plan in the event of an attack (in West and Orr (2005)).

However, even if there is little actual investment in security equipment, consumption and savings preferences are influenced by security considerations. These changes in demand patterns due to risk aversion become visible in the impacts on different sectors of the economy, some of which as will be seen below have suffered substantial losses due to fear of terrorism. As important policy conclusion, Drakos and Kutan (2003) point out that state aid to companies suffering from adjustments in consumer demand due to terrorism will be futile, in cases where demand has permanently changed.

b) Security measures of the private sector

The available options of security measures of companies are very similar to households: investment in security equipment and technologies and management decisions to hedge against the risk of a terrorist attack, reflected for example in investment decisions. In theory, companies that face direct threats from terrorism, have to incur expenses for security technology, insurance cover and often have to pay a risk premium to their employees in the form of higher wages and salaries; actual quantities depend on the nature of the threat and the respective sector.

The underlying factor that drives security spending arises from a company's and its managers' degree of risk aversion. The literature both academic and practical agrees, that risk aversion and the willingness to accept risk varies markedly across time, space but especially between individual managers: a study by Ryans and Shanklin shows that in 1980, 82 top international officials from US and overseas multinationals ranked terrorism as key barrier to investment right after inflation. In contrast PricewaterhouseCoopers 10th Annual Global CEO Survey in 2006 concludes that CEOs, after the unprecedented attacks of 9/11, are less worried about unforeseen shocks such as terrorism or natural disasters but rather about an overregulation of the economy.²⁸ The report further highlights how degrees of risk

²⁸ Although no direct reference to security measures were made in this study, it could be inferred that companies are more worried about negative impacts of counter-terrorism measures involving security regulations on their businesses than about terrorism itself.

perceptions differ across individual CEOs, across geographic areas; and across economic conditions. Michel-Kerjan and Pedell (2007) arrive at similar conclusions regarding the little perceived risk of terrorism in a study which compares the up-take of terrorism insurance cover in Germany and the US in the years after the introduction of the respective terrorism risk insurance acts. On the one hand, they argue that a suite of factors other than an actually heightened sense of insecurity²⁹ account for the increased up-take of terrorism risk insurance; on the other, they provide data from a US Treasury Survey, which finds that 90% of respondents to a US Treasury survey that did NOT purchase terrorism insurance believe “it will not happen to them” (U.S. Department of Treasury, 2005 in *ibid*).

Consistent with this low risk perception, McKinsey (2006) finds that only three respondents in ten, report that their companies have taken active steps to prepare for any one of the following scenarios that could harm virtually any company: a pandemic, a natural disaster, or increased geopolitical instability, such as terrorism.³⁰ In a similar vein, PricewaterhouseCoopers 10th Annual CEO survey shows that “of all the threats, availability of key skills and low-cost competition are the two that companies are addressing with significant resources”, whereas terrorism does not induce significant spending (PricewaterhouseCooper 2007)– both findings accord with Suder's (2004) main argument who points to the necessity to incorporate geo-political risk, including terrorism, into risk assessment strategies.

Higher levels of risk further impact on investment, not only due to a change in allocation of resources but also due to an aversion to commit to new projects due to uncertainty (Brück 2006). Yet, Purnell and Wainstein (1981) conclude that at least in the case of US businesses, neither the costs of terrorism nor the consequent costs of security measures seem to impact on profitability significantly that US businesses would pull out of countries affected by terrorism. Yet, aggregate patterns of investment flows contradict this optimistic conclusion as will be shown below.

²⁹ These factors include regulatory measures, reduced prices for terrorist coverage and greater concern about possible liability under the Sarbanes-Oxley Act, should executives be deemed to have failed to protect corporate assets.

³⁰ The McKinsey Quarterly conducted the survey in March 2006 and received 3,470 responses from a worldwide representative sample of business executives, 44 percent of whom are CEOs or other C-level executives. Ranked according to importance, the three most important risks against which companies prepare are major regulatory changes (58%); substantial changes in currencies, interest rates or inflation; and a global or regional slow down. In contrast, only 26% prepare for geopolitical instability (e.g. terrorism).

The limited concern about terrorism is not surprising given that only specific sectors are likely to face a direct threat; and that indirect terrorist threats work through other channels, i.e. changes in demand, disruption in supply chains and other operation risks. In other words, terrorism is likely to be addressed within other risk factors. But even if terrorism is addressed within these wider sets of risks, Buehler & Pritsch (2003) suggest that the corporate meltdowns of recent years show that many companies “neither manage risk well nor fully understand the risks they are taking”.

A potentially even more important reason for the lack of security measures could derive from the complexity to manage terrorism risk, which arises from several factors such as the interdependent security environment in which businesses are located; the elusive threat and dynamic uncertainty created by terrorism; and the significance of government actions to increase or decrease the threat level that businesses face. Especially the first and third point create large disincentives to security investments, as the effectiveness of protection against terrorism is dependent on the level of protection of the weakest link and thus investment by one company does not necessarily mean an actually enhanced level of security if other companies or government fail to cooperate.

In conclusion, it is necessary to ask whether businesses’ little security investments are justified given the low probability nature of terrorist events or whether they are in fact under-investing at the possible expense not only of their operations but also society at large, given that a terrorist attack can incur costs that stretch far beyond companies’ boundaries as 9/11 and other events have shown. These intricate interdependencies give rise to the debate about public-private partnerships to overcome coordination failures between companies to ensure adequate security standards in the industries. As the rest of this section will show, regulations can have significant repercussions on economic competitiveness, which leads back to the above mentioned trade off between scaling down on efficiency expectations versus enhancing the security of the overall system.

c) Security measures at government level

While private agents’ activities are mainly focussed on enhancing their own level of security through protective measures, governments face the responsibility to have to allocate their available resources between defensive and pro-active measures. The choice between the two is critical especially regarding their actual impact on enhancing the security level of a country. Enders and Sandler (2006) find that there is a proclivity to favour defensive counter-terrorist

measures over proactive policies, which will result in an equilibrium with socially inferior payoffs when compared with proactive responses. Proactive policies tend to provide purely public benefits to all potential targets and are usually undersupplied, whereas defensive policies tend to yield a strong share of provider-specific benefits and are often oversupplied. The reaction to 9/11 has been a mix of defensive measures, (e.g. security regulations at borders and transport hubs), and proactive measures (the invasion of Afghanistan and Iraq, and the global pursuit of terrorists). Yet, while governments shoulder the costs of proactive measures, it is the private sector and households who appear to be carrying much of the burden of e.g. regulatory protection measures by government. It has been estimated that the private sector will face about US\$ 10 billion a year due to US homeland security measures, although initially they could be much higher (in the range of US\$ 46 billion to US\$ 76 billion) (Stevens 2003). Thus, governments' regulatory measures to enhance security can have significant impacts on the economy.

This leads to the question of appropriate government involvement in security provision. In this respect, the case of security provision in the aviation sector provides an illustrative example: The fact that security at one airport can affect the well being of those at other airports and elsewhere provides an economic justification for governmental involvement in aviation security (Coughlin, Cohen et al. 2002). A fundamental question is whether the role of the state should be restricted to setting and monitoring security standards or whether its role should also include the financing and implementation of security. In the US, a controversial change is that the federal government has assumed responsibility for the actual provision of aviation security. Proponents of this change argue that, relative to private provision, public provision reduces the incentives to reduce quality through cost reductions. On the other hand, a public agency might not provide security services efficiently as it operates in a monopolistic way. Furthermore, a public agency might provide an excessive amount of security and incur unnecessary expenses because it is likely to be judged on its security record and not on all the attributes encompassed by air transportation services for consumers. Thus, economic theory does not provide a clear answer to what is likely to be a continuing source of controversy - the appropriate scope of governmental involvement in aviation security (*ibid*).

5.1.2 Impacts across sectors

Congruently to the varying degree to which sectors are implicated directly by terrorist attacks, the economic repercussions of security measures impact differently across sectors. Those who face direct risks of terrorism are bound to incur the most costs to protect themselves against an attack. Particularly, the transport industry has invested large amounts into enhanced security.³¹ While terrorist attacks on transport and infrastructure have happened in the past, it was 9/11 which induced major increases in security measures to be applied across the entire transport sector (aviation, maritime transport, road and rail).

The aviation industry surely was the sector strongest hit by security measures, first due to stringent security regulations introduced after 9/11, and second due to severe drops in demand in cargo as well as passenger traffic due to risk-averse customers. Since 9/11 it has been estimated that airlines have spent US\$ 43 billion on security measures, including more thorough baggage checks, greater in-flight inspection and new regulations for secure cockpit doors (World Bank 2003, in Department of Foreign Affairs and Trade (2004)). In the US, the US Aviation and Transportation Security Act of 2001 estimated the cost to the federal government at around US\$ 9.3 between 2002 and 2009. Airport operator's additional costs are expected to be around US\$ 56 million annually (Coughlin, Cohen et al. 2002). Some of these costs have been shifted to customers: in response to the enhanced security, many airlines have started to add "security surcharges", resulting in fee increases of up to US\$ 8 per person or within the range of US\$ 0.10 to 0.15 per kg of cargo (Walkenhorst and Dihel. 2002).

In the shipping industry, a series of measures aimed at strengthening maritime security have been adopted by the International Maritime Organisation (IMO) which includes for example the International Ship and Port Facility Code (ISPS) in December 2002. The costs of implementing the ISPS to ship operators (including the installing of security equipment) has been estimated to reach US\$ 1.3 billion and ongoing operating cost of around US\$ 730 million annually. System wide procedural changes though difficult to account for, have been estimated to cost US\$ 282 million. The overall costs of those transport counter-terrorism measures were estimated in 2003 to amount to over US\$ 2 billion (OECD 2003, in Department of Foreign Affairs and Trade (2004)).

Yet, increased security may not only incur negative impacts. At least in the case of the financial sector, the introduction of tighter monitoring of financial transactions seems to have had some positive returns. As a survey³² on Anti-Money Laundering (AML) initiatives in the banking and financial sector implemented by PricewaterhouseCooper (2005) shows, AML initiatives are seen to contribute to improve competitiveness in the long run, though if implemented unevenly across countries, can disadvantage those with more stringent requirements. Even if AML initiatives are one of the biggest drivers of increased compliance costs in the Western hemisphere and smaller banks are beginning to feel the pressure and complain about this new regulatory burden, the industry in general believes that the approach is justified within the current (in-) security environment and the role of financial flows.

In general, security investments could contribute to improving efficiency and effectiveness of specific sectors and the economy as a whole, especially where security against terrorism can be coupled with general security issues (DfAT, 2004). Yet, so far no analysis exists that demonstrates potential positive impacts of enhanced security on overall operations.

Apart from the direct costs that sectors incur to protect themselves and society against terrorism, changes in demand and consumption patterns, arising out of security concerns of clients and customers as discussed above have had significant impacts on those sectors, through which customers face a direct risk of terrorism.

This first includes the transport sector, and specifically the aviation industry which has received most attention in the literature. Airlines had already been facing difficulties before 9/11; the subsequent drops in demand which hit particularly American airlines led to estimated losses for IATA members of US\$ 15 billion in 2001 (Drakos 2004) and an additional aggregate loss of US\$ 12 billion in 2002. Boeing Commercial Airplanes announced a 30,000 manpower reduction (Hooke 2006). It is noteworthy, that the low cost sector did not suffer under this decline: Southwest, jetBlue in the US and Ryanair and Easyjet in Europe did not only grow but were among the few to record profits and positive cash flows (*ibid*).

Tourism is the second sector which suffers significantly under changes in demand due to risk aversion. For Spain, which has not only suffered under ETA but also other (mostly left-wing)

³¹ The figures given below, are based on estimates shortly after 9/11, thus, they are provided merely to give a dimension but should not be considered accurate in the present context.

³² The survey is based on questionnaires which were answered by selected key individuals from banks, vendors and financial institutions.

terrorist groups, it has been estimated that a typical terrorist act scares away over 140,000 visitors, combining all monthly impacts (Enders and Sandler 1991). Enders, Sandler et al. (1992) estimate the actual losses in tourism revenue for Austria, Italy and Greece to amount to US\$ 4.538 billion, US\$ 1.159 billion and US\$ 0.77 billion respectively between 1974 and 1988.³³ For the same period, continental Europe as a whole lost US\$ 16.145 billion due to terrorism (total tourist revenues in 1988 were US\$ 74.401 billion).³⁴ This highlights on the one hand, the significance in tourism losses, on the other, the variability of losses across countries. While Austria, Greece and continental Europe as a whole lost substantial portions of their revenues (40%, 23% and 21% respectively) the losses in Italy amounted “only” to 6%. Negative relations between terrorism and tourist demand have also been observed in other countries, including Israel and Turkey. Fleischer and Buccola (2002) estimating a supply and demand model of the Israeli hotel industry between 1992 and 1998 estimate a 1.27% loss of total revenues over this period, which rises with a deterioration of the situation.

Not only impacts but also the immediacy with which these impacts come into effect seem to vary strongly: while Enders and Sandler (1991) and Fleischer and Buccola (2002) find relatively immediate effects of terrorism on tourism, i.e. after two to three months for Spain and Israel respectively, Enders, Sandler et al. (1992) find a $\frac{3}{4}$ lag before terrorism affects tourism in Greece, while tourism remains unaffected by a terrorist incident until a full 18 to 21 months afterwards in the case of continental Europe and Austria respectively. Frey, Lüchinger et al. (2004) explain these variations with the differences in the structure of terror campaigns not just across countries but also across time (Frey & Lüchinger, 2004). Differences in time lags could further stem from differences in booking systems, where existing bookings are kept while changes only become apparent in the number of new bookings.

Even if impacts are significant, research shows that these effects are transitory even short-lived, yet, it provides no unambiguous conclusion regarding the relationship between continued attacks and permanency of impacts: Aly and Strazicich (2000) studying annual bed nights in Egypt and Israel conclude that the impacts on the tourism sector remain transitory

³³ This was calculated in 1988 terms, using a real interest rate of 5%. For comparative purposes, total revenues in these countries in 1988 amounted to \$11.149 billion, \$19.311 billion and \$3.29 billion respectively.

³⁴ Note the methodological difficult to find an appropriate counterfactual: not the number of tourists before the attack should be taken as point of comparison, but the estimated increased number at the time of the terrorist attack.

despite continued acts of terror and regional instability. Pizam and Fleischer (2002) in contrast, focusing on Israel argue that tourist destinations can recover even from severe acts of terrorism, as long as the terrorist acts are not repeated. Thus, when acts of terrorism - whether of high or low severity - occur at high frequency and regular intervals, tourism demand will constantly decrease, and eventually the destination's tourism industry will come to a standstill. It is interesting to note, that the frequency of attacks seems to impact on terror, while the severity of an attack seems not to influence tourism demand.

A second effect which has been researched is trans-boundary impacts of terrorism on other tourist destinations, especially neighbouring countries. Of importance here is Drakos and Kutan's (2003) study on spill over and contagion effects. Using monthly data for the period 1991 to 2000 they investigate the effect of terrorism in Greece, Israel and Turkey on each other's market share, with Italy serving as a control country, representing the rest of the Mediterranean region. They find significant substitution effects as well as empirical evidence for contagion effects. Only around 11% of aggregate losses in market shares are directed toward other destinations within the group of countries under consideration, whereas around 89% flow out into safer regions (in Frey, Lüchinger et al. (2004). This demonstrates the necessity to consider the usefulness to understand fears of tourists to base strategic and operational marketing strategies on them Dolnicar (2005).

Yet, even sectors who do not explicitly invest in terrorism can be negatively affected by security measures. As shown above, some of the costs of security investments in the transport sector have been passed on to clients rather than having been fully internalised by the companies themselves. Consequently, trading sectors relying on their services will face increased costs not in the form of higher transport fees but also in the form of longer transport durations and delays as will be shown in Section 5.1.3 below.

In contrast to these negative repercussions, those sectors providing security technologies and services, namely the defence and security industries³⁵, benefit from investments into security technologies. The military response to the attacks of 9/11 reversed the declining trend in

³⁵ Historically, the security and the defence industry have been clearly separate sectors, the first mainly providing goods and services to the private sector and households, the latter, mainly supplying goods and services to governments. Yet, in the light of new security challenges, these sectors are more and more converging, which also explains why these sectors will be treated jointly in this report. The security economy encompasses all those products and services which are concerned with preventing, reducing and mitigating harm to life and property due to ordinary and organised crime, which according to Stevens (2004) incorporates defence and counterintelligence, the public police force, private policing, armed guards and security technology providers.

military expenditure which had set in with the end of the Cold War (Richard Sykes 2005). According to SIPRI, global military spending increased by 18% between beginning of 2002 and the end of 2003, with the US, Japan, UK, France and China accounting for 64% of the world market (note that the US alone spends 47% of the global total). Yet, Sykes (2006) does not expect this rise to last, apart from potentially in the US where defence spending has increased by over 60% in the past ten years, amongst others for the reason to combat global terrorism (*ibid*). Further, given new characteristics of security challenges, particularly embodied in asymmetric warfare against a clandestine enemy, military expenditure is now demanding more flexible, responsive and mobile forces. Thus, the military industry will have to adjust its products and services in order to realise this increased demand (*ibid*).

The security industry in contrast appears to be experiencing sustainable growth. Available estimates put the private security industry's turnover at between US\$ 100 billion and US\$ 120 billion worldwide.³⁶ The largest share is accounted for by the United States, although other OECD countries have sizeable security industries as well. For example, Germany's is thought to be around US\$ 4 billion and France's and the United Kingdom's around US\$ 3 billion (Stevens 2003). There is little evidence within the industry of a major upsurge in spending on security since 9/11, however, longer-term data suggest healthy growth in turnover in the order of 7-8% annually, easily outstripping average annual economic growth rates. Prospects for some segments, including biometrics, radio frequency identification (RFID) technologies and computer security are particularly favourable (*ibid*). But terrorism is not the sole driver of the security industry; an increasing trend in organised crime, perceptions of increased personal insecurity (ordinary crime has actually fallen since the mid-90s) and the characteristics of the global economic system³⁷, which make protection more necessary spur the growth of the security industry and consequently not all growth effects can be attributed to terrorism.

In conclusion, it appears that in the short run the military industry benefited greatly from the first reactions to 9/11 while in the long run, it will be the security industry that will profit mostly from the new insecurity environment that is posed not just by terrorism but various other forms of human induced insecurity.

³⁶ It is necessary to point to the difficulties to measure the value added of the security industry and spending on security mainly due to data but also accounting problems, and therefore the figures are merely an attempt to provide a some dimensions of this still somewhat elusive sector.

5.1.3 Macro-economic impacts

Ultimately, micro-economic processes and behaviour translate into macro-economic impacts which are reflected in various variables. Just as at micro-economic level, it is necessary to account for a) the direct results from increased spending in security measures, which translate into fiscal effects, aggregate consumption and investment; b) for the indirect impacts, which result from the security measures taken, reflected in e.g. increased transaction costs and repercussions on the competitiveness of the economy and c) the aggregate impacts of changes in consumption and investment spending which do not result from direct security investments but rather from risk aversion.

a) Fiscal effects

In theory, a negative shock such as a terrorist event is expected to incur an increase in public security spending (Brück 2006), with the potential effect to retard long-term growth as first, high budgets for defence and homeland security may crowd out more growth-enhancing investments; and second, there is some evidence that public security spending may also crowd out potentially more efficient private sector attempts to increase security. In fact, Stevens (2003) contends that governments and other public authorities have increased their overall spending on security, in some cases quite substantially. The US Homeland Security budget doubled from fiscal year 2002/03 to its current level (2004) of well over US\$ 30 billion: funding for aviation security is now running at US\$ 4.8 billion and for border security at US\$ 10.6 billion. He concludes that such investments are funded by government taxes or private spending. Consequently, even if this will not incur significant budgetary impacts, economic impacts will still be significant.

In contrast, Gupta et al (in Brück (2006)) who analyse the changes in composition of public spending in low and middle income countries show that terror and armed conflict leads to increases in defence spending with a negative impact on public spending on social and economic issues. Thus, they show that the fiscal effects of defence and security spending in medium and low-income countries can have a significantly negative fiscal impact and consequences for future economic growth.

³⁷ These characteristics include longer pathways which make products more vulnerable; increased mobility of people and thus migration patterns; the vulnerability of information technology; but also global competition which requires speed and efficiency sometimes at the expense of system resilience.

b) Growth

Related to the fiscal impacts of security spending but more complex is the relation between security spending and growth. A large body of literature exists discussing on the one hand, the impacts of defence expenditure on economic growth (Ram 1995; Cohen, Mintz et al. 2003; Lee and Chang 2006) and analysing potential spill-overs of defence R&D for the economy (Lerner 1992; Cowan 1995; Lichtenberg 1995; Trajtenberg 2004). Yet, this literature does not identify a straightforward relation between the expenditure on defence and growth. Various studies show that defence-growth relationships can take many forms: defence spending can have a lagged effect on growth; it may even spur growth in the short run, while constraining it in the long run or vice versa. Rather than directly, defence spending may impact on the economy through indirect channels. In fact, the causality may even be reversed and economic development influencing defence spending. Cohen, Mintz et al. (2003) provide a more nuanced analysis differentiating between short and long term, direct and indirect impacts and thus provide a more cautious conclusion about both the impacts of defence expenditure on the one hand, as well as the impacts of the so called “peace dividend”.³⁸

In contrast to the extensive literature on defence–growth relationships which was outlined above, hardly any literature exists on the impacts that terror security spending will have on economic growth. Baily (2001) concludes that provided fiscal discipline prevails, there is no reason to fear that long run growth is compromised for higher security. Rather than increased security spending he points to potential negative effects of a reversal of the current state of liberalisation. Baily’s argument accords to Hobijn’s (2003) assertion that neither private nor public security spending will have a major impact on the US economy estimating that private security spending will reduce labour productivity by only 1.12% and multifactor productivity by only 0.65% with only small aggregate results on US GDP. Regarding, public security spending, he calculates that homeland security spending will reduce output only by 0.6 % over a five-year period. Judging by the much larger scale of military spending in the 1980s, he believes that to be negligible and to have no effect on the US budget deficit. Lenain, Bonturi et al. (2002) estimate the results of security spending to lead to a reduction in real GDP by about 0.7 % after five years.

³⁸ The peace dividend refers to the economic growth resulting from a shift of government expenditure away from defence spending into economically productive sectors.

However, these results are thought to be too optimistic (Brück 2006). In addition, they were made shortly after the 9/11 attacks where the full extent of the counter terrorism measures could not be known. Therefore, it is necessary to treat these conclusions with caution. Furthermore, these estimates only refer to security spending in the US, i.e. a large and well developed economy with an annual GDP of over US\$ 13 trillion. Evoking Gupta et al's (2006) conclusion on the negative fiscal impacts of security spending in low and middle income countries, it is possible that security spending could have a significantly retarding effect on economic growth in small and less developed economies.

Another pertinent issue raised in National Research Reports of EU member states³⁹, are possibilities for cross fertilisation between military and security technologies. This implies that rather than "reinventing the wheel" security R&D should build on existing knowledge and available technologies thus using this knowledge more effectively and creating economies of scale.

c) Trade

The literature pays specific attention to the negative impacts of slowed down transport and trade flows due to heightened security measures at borders and transport hubs (Brück 2006). These "frictional costs" of trade arise not only due to delays at transport hubs and border controls but also due to increased insurance charges and prices for security measures which are passed on from operators to clients. In quantitative terms it has been estimated that a one-day delay due to border controls costs 0.5% of the value of the delayed good (Hummels 2002); Leonard (2001) suggests rising trading costs of 1% to 3% ad valorem after 9/11 (Leonard 2001), (Walkenhorst and Dihel. 2002).⁴⁰ This increase corresponds to an annual increase in production costs of traded goods of US\$ 5.6 billion to US\$ 16.8 billion (which however is hoped to be an upper bound as these estimates were made right after 9/11) (Walkenhorst and Dihel. 2002). Ultimately, with an estimated elasticity of trade flows (in volume terms) with respect to transport costs (ad valorem) of -2 to -3.5, Limao & Venables (2001) expect trade to reduce by this factor.⁴¹ It is necessary to note that these impacts on

³⁹ The respective member states are the Netherlands, Germany, UK and France.

⁴⁰ Prior to 9/11, estimates of the cost of time delays, paperwork and compliance related to border crossing ranged from 5 to 13% of the value of the goods traded.

⁴¹ As pointed out before, these figures were calculated shortly after 9/11 and are not based on empirical evidence but rather on crude estimations and assumptions. They are provided as more recent and accurate figures do not exist and to show the possible effects, even if they are merely hypothesised.

trading costs and subsequently trading volumes will vary across goods as well as trading countries: goods with a high value to weight ratio whose share of trading costs already before 9/11 had a lower proportion of the value (e.g. pharmaceuticals) are expected to be less affected than goods with a low value to weight ratio (e.g. fertilisers) (Walkenhorst and Dihel, 2002).

In 2001/2002, when these studies were implemented, authors such as Walkenhorst and Dihel (2002) expected security measures to abate over time, with an enhanced perception of security in the transport and trade sector, yet, given continued attempts to attack infrastructure, costs in fact are likely to have increased.

Yet, not all see these increased investments in security necessarily in a negative light. Mirza and Verdier (2006) for example point to the two-way relationship between terrorism and trade-openness, which implies that the relative costs and benefits of openness in relation to terrorism⁴² have to be carefully assessed against the costs of enhanced security measures.

d) Investment

Last but not least, macro-economic impacts of security measures result from changes in investment behaviour due to increased risk aversion. Ryans and Shanklin (1980) in their study of 82 executives of leading multinationals in the US show that a firm's decision to expose itself to the risk of terrorism in a host country will be determined by the returns on the investment, which must be considerably greater than under normal conditions. Thus high returns on investment are likely to be the reason for Purnell and Wainstein's (1981) finding that despite potential difficulties businesses will not pull out of a country but rather cope with terrorist threats or attacks as with other acts of violence.⁴³

Yet, in contrast to the relative manageability of terrorism that these micro-analyses suggest, aggregate studies are more pessimistic about the relation between terrorism and capital flows. Frey, Lüchinger (et al. 2004) based on studies of Spain and Greece find that protracted political insecurity through terrorism will have significant negative impacts on foreign investment inflows. Capital inflows to Spain decreased by 13.5% on average over the period

⁴² Such assessment should not only focus on benefits to counter terrorism but should incorporate an analysis to what extent security measures against terrorism could enhance overall system security against a variety of vulnerabilities.

⁴³ This is consistent with empirical findings of e.g. industrial economies which shows that economic variables (linkages into the global market economy, available technological capabilities, etc) are more important than geo-political factors.

1968 to 1991⁴⁴; Greece which was plagued by two major terrorist organisations in the same time period, experienced a comparable reduction of direct foreign investment averaging 11.9% annually.⁴⁵

At a cross country level, Blomberg and Mody (2005) estimate the quantitative implications of violence on international investment. Three findings emerge from their analysis: first, violence at home tends to move investment abroad; second, violence in the host country deters both trade and FDI flows; particularly strong in developing countries; thirdly, WTO membership appears to counter the negative impacts on bilateral FDI flows, which suggests that while violence raises political risk and discourages investment flows, WTO membership signals a commitment to lower country risk

As stated above, irrespective of more positive opinions at the micro-economic level, the literature on aggregate effects shows that trans-national capital flows are adversely affected by measures adopted to avoid the risk of terrorism (Llusa and Tavares 2006).

5.1.4 Trans-national and global impacts

9/11 has not only been unprecedented in its scale but also in its global implications. Given the inter-dependency of the economic system, local effects have shown to result in magnified global repercussions. This holds not only true for the impacts of the terrorist event but also for the economic impacts of security measures. Especially since the perpetrators come from different countries, security policies have incorporated actions with trans-boundary reach. While global welfare losses may be small, the impacts on specific regions, especially developing countries may be large (Walkenhorst & Dihel, 2002). For example, due to their strong dependence on trade with Europe and the US, Southern Asia, North Africa and the Middle East suffer the most damage related to changes in trade due to security measures. That means that developing countries may be particularly affected by the first- and second-order effects of terrorism.

Apart from trade impacts, security related changes in international policy have changed the discourse and allocation of aid to developing countries. New practices such as increases in aid

⁴⁴ This translates into a decline in real direct foreign investment of almost 500 million dollars, or 7.6% of annual gross fixed capital formation.

⁴⁵ This translates into a loss amounting to almost 400 million dollars, or 34.8% of annual gross fixed capital formation.

for military expenditure, employed under the name of counter-terrorism are criticised to run counter development objectives and international commitments to human rights (Tujan, Gaughran et al. 2004; Beall 2006). Yet, overall, little literature on the global and trans-boundary economic impacts of security measures is available.

5.1.5 Impacts on civil rights and democracy

The debate on the repercussions of Anti-Terrorist Measures on civil liberties and democratic rights and freedoms surpasses the scope of this report which focuses on the economic not political impacts. However, especially since Tavares (2004) finds a positive relation between the resilience of economies and democratic rights, the potential negative repercussions of anti-terrorism measures on democratic freedoms warrant at least mentioning and its impact on the resilience of economies could be a further field of study.

Apart from the impacts of security measures on citizens' rights in terror target countries, the impacts of aggressive counter-terrorism measures in terror host countries have been found to terrorise innocent citizens (Kivimaeki, 2003). Yet, economic repercussions in the form of monetary and welfare losses, which are likely to arise from these measures have not been quantified in the literature.

5.1.6 The determinants of the economic impacts of anti-terrorism policy

In conclusion, while acts of terrorism have only temporary effects on a mature economy, this section has shown that counter-measures to terrorism can extent the impacts of terrorism throughout the economy. Compared to the impacts of a terror attack, the determinants and outcomes are much more diffuse and more difficult to anticipate and capture. Even though empirical proof is scant, the available literature points to the following factors which at least in theory determine the economic repercussions of security measures: a) the choice of security measures that are adopted, b) how and by whom security is provided and c) the economic context in which security measures are implemented and d) the effects security measures have on future terrorist attacks.

As this section has shown, the economic impacts of security measures are determined first, by the actual type of measures adopted across various economic agents. These not only determine the actual overhead investment or financial outlay necessary but also to what extent there is scope to create synergies between different security measures. Further, the respective

security measures will influence the indirect impacts on the economy through e.g. impacts on transaction costs and externalities.

Actual security measures adopted across economic agents are influenced by the perception of the actual level of insecurity and the underlying threats and in the case of public agents often by political considerations some measures more appropriate to retain the confidence of their constituencies and to demonstrate power towards perpetrators (Enders and Sandler 2006). Thus, especially at government level, the appropriate form to reinstall security (actual and perceived) is often seen to lie in aggressive action. Considerations of economic impacts which are often distant in the future and not easy to calculate appear therefore to be mostly left out of policy considerations.

As importantly, actual security measures as well as the costs of these measures are determined by the expected behaviour of other actors. Especially in the case of trans-national terrorism, cooperation between countries is essential to maximise the cost effectiveness of counter-terrorism measures. Non-cooperation does not only imply that a few actors have to bear the costs of the measures, but it also implies given inter-dependent security, that the measures are unlikely to be effective, which in turn creates disincentives to invest in certain policies.

Security just as any other good or service can be provided more or less economically efficiently. As the case of airport security shows, one major question that has so far not been answered is whether governments or the private sector are better placed to provide maximum security at minimal costs. Related to this, in theory, economic repercussions will further differ depending on the mechanisms and approaches – e.g. market mechanisms versus regulations – that are employed to induce security provision. Brück (2006) models the implications of security spending, which could be voluntary, in response to market forces, or forced due to new security regulations and legislation: While the first scenario (voluntary security spending) is akin to an insurance spending, the second (responses to market forces) may result in higher costs, yet at the same time could prevent or even raise revenues, while the third (regulated security spending) is congruent to an environmental regulation, increasing social welfare, at the expense of producers with the effect of an overall decrease in the industry's productivity (*ibid*).

Lastly, the ability to coordinate security measures across economic agents not only within but also between economies is likely to impact on economic repercussions in two ways: first, given the inter-dependence of security and insecurity, a failure to coordinate measures across

all links of a system may render individual security investments impotent, therefore rendering no or negative returns to the investment, second given potential negative impacts of competitiveness on involved economic sectors, the economic repercussions of security provision will also be determined by the ability to coordinate security measures across competitors in different economies.

Even though little information is available, Gupta et al (2004) (in (Brück 2006)) suggest that security spending will impact differently on different sized economies; not surprisingly, as a certain level of security spending implies a higher share in overall spending in a smaller than in a larger economy. However, as the Australian Department of Foreign Affairs and Trade (DFAT) argues, especially for developing economies, spending on security measures can imply an investment into investor confidence and therefore boost economic development. Hypothetically, basic investments to enhance security could impact positively on a smaller “less secure” economy up to a certain level, increasing its resilience as well as confidence of economic players in it. This effect could level off, the more developed the economy is, while in fact, reverse, i.e. create negative repercussions in highly developed and open economies due to negative impacts on economic efficiency. This however, is a hypothesis and the actual dynamics between security and economic development require more careful research.

Related to this, wherever investments in security technologies are necessary, the economic impacts will differ depending on whether an economy is net importer or exporter of these technologies. If an economy’s security sector is sufficiently large and competitive, this sector and the aggregate economy are likely to gain from increased investments in security. Yet, on the other hand, countries which do not produce necessary security technologies will need to import these goods and services, which implies a leakage in the economy. Thus, economic effects of security spending will partly be determined whether a country is a net-importer or exporter of security technologies and services.

Last but not least, long run costs of security measures will be determined by their actual impact on terrorist behaviour. In sharp contrast to security threats emanating from e.g. natural disasters or industrial accidents, human drivers of insecurity deliberately seek to undermine security measures. In the best case scenario, security policies will be effective and acts of terrorism will cease; however, in the worse case scenario, terrorists will adjust their behaviour to undermine security measures which may result in more severe actions and thus increased costs from terror activity. As Enders and Sandler (2006) show these considerations are not

merely theoretical but reality, however, these costs are often not incorporated into cost-benefit analysis of policy measures.

5.2 Limitations in the existing literature

The economic repercussions of security measures are rather less understood than the impacts of terrorist events. As the survey above shows, the available information is patchy, much based on theoretical reasoning and estimates especially with regards to the indirect impacts of security spending on growth, efficiency and competitiveness, with only little rigorous empirical analysis.⁴⁶

5.2.1 Micro-economic analysis

The first critical knowledge gap which makes it difficult to assess the economic repercussions of security measures is the limited information on the actual measures taken across various economic agents. Even though it has been established that fear and uncertainty can have significant impacts on consumption, savings and investment behaviour (as well as political decisions which can have repercussions on the economy) little empirical knowledge is available how and in what directions the supposed increase in insecurity has impacted on security behaviour across economic agents in the EU. Analysing these economic patterns could also shed light on the extent to which EU member states have succeeded in restoring confidence into the security of their economies.

Similar to the lack of information regarding the economic impacts of terrorism at household level, there is no empirical information how costs and benefits of security measures are passed on to the micro-level, e.g. through changes in fiscal policy (taxes) to cover costs, or through price changes.

Further, especially in the case of trans-national terrorism, which incorporates the involvement of perpetrators of nationalities other than victims, no information is available how security measures impact on perceptions on these nationalities or more generally different ethnic groups in target countries. Security measures levelled against a certain nation could stigmatise

⁴⁶ One reason why relatively less information is available on this specific issue could be that the conventional literature does not neatly differentiate between the two cost elements. Rather, it lumps the economic repercussions of security measures under the heading of economic impacts of terrorism.

people of certain nationalities and ethnicities and these discriminatory impacts could have repercussions labour markets in specific and social cohesion in general.

5.2.2 Macro-economic analysis

Congruent to the lack of knowledge on actual security measures taken by various economic agents, there is insufficient information on the repercussions of these security measures beyond back of the envelope estimations and theoretical deliberations. While the costs of 9/11 have been accounted for comprehensively in various studies, the costs of security measures have never been estimated methodically. This is not surprising given that many of especially the indirect impacts (e.g. increased frictional trading costs, etc) occur only in the medium to long run and the most significant measures have only been introduced after 9/11. Nevertheless, six years after this decisive event, it is now time to carefully re-assess the full economic repercussions across various economies including cross-border effects and externalities.

Especially in the case of trans-national terrorism, no information exists on the repercussions of security measures on countries that are direct targets of these security measures, due to their involvement in terrorism as “host states”. Accounts from terror host states show that governments adopt often brutally repressive measures to fight terrorism on their territory. Yet, the economic impacts of these measures remain unaccounted for. The analysis of the economic impacts of security measures in less developed countries is of particular importance as lack of economic development and opportunities are (although not unambiguously) associated to provide fertile ground for terrorist recruitment.

Last but not least, at a more conceptual level just as terrorism as a form of insecurity should not be analysed in isolation from other security threats, security measures to counter terrorism should be assessed in comparison to other forms and levels of security. Of specific interest is whether synergies can be created between security measures which target different types of security threats. Beyond specific case studies, a generalised analysis is lacking which studies the relation between security, insecurity and economic growth and development, not only with the viewpoint of enhancing security against terrorism but by integrating terrorism within the larger security agenda.

If a trade-off exists between security from terrorism and economic security, criteria should be developed to identify the optimal level of security. This should be related to a revision of the

actual objectives of security, whether to decrease an uncertain terrorist threat in isolated fashion or whether to enhance system stability.

6 INTERACTION OF ACTORS OF INSECURITY AND SECURITY

The last section concentrates on the dynamics between “actions of security and insecurity”. As Enders and Sandler (2006) point out security measures often do not take their full dynamic costs into consideration failing to recognise that terrorist behaviour is not static but adapts to security measures. This adaptive behaviour implies in the long run that the full economic repercussions of security measures have to account for the costs of terrorist attacks in the next time period which may not decrease but in fact increase in response to security measures. Moreover, terror may not only increase over time, but also shift geographically, taking advantage of weakest links in relatively less protected areas.

The literature has identified “stylised facts” of the dynamics of terrorism. Even though these models have proven useful, they nevertheless are too limited to explain all the various outcomes that have been observed in reality.

6.1 Existing studies and research

6.1.1 What determines terrorist behaviour

The literature builds on some key assumptions to analyse the dynamics of security policies: all subsequent arguments are based on the essential understanding that terrorism is not a random phenomenon (Drakos and Gofas 2006). Rather, economic theory shows that terrorists behave like any other economic agent - rational, which implies that they face a well defined set of preferences, and will select their preferred choice of action to maximise utility within a given resource constraint (Enders and Sandler 2006). At the most basic, terrorists face the choice to allocate their resource endowments between terrorist and non-terrorist action in order to achieve a political goal; within the category terrorist action, terrorists can choose from a variety of modes and forms of terrorist attacks. Consequently, theory predicts that a change in the relative price of one of the elements of choice will result in a shift of terrorist action towards the relatively cheaper activity, be it a different form of terrorist, or non-terrorist action.

Within this framework, even suicide bombers have been modelled as rational agents: at the most basic, suicide bombers value the choice of “life in paradise” and worship as martyr

higher than their present life.⁴⁷ Staying alive in fact may not only imply foregoing paradise but also loosing group solidarity in real life (Wintrobe 2001). Beyond merely achieving spiritual gain and social standing in the community more tangible motives exist: Azam (2005) points to the financial benefits that families of suicide bombers receive as reward for the sacrifice; Berman & Laitin (2005) highlight the practicality of self-sacrifice to prevent apprehension thus minimising risks of negative consequences for captured terrorists as well as for terrorist organisation. Irrespective of the final motive for suicide bombings, what matters to this section is that given the rationality of suicide bombers in specific and terrorists in general, their behaviour is expected to change with a change in the relative prices of alternative actions.

Yet, the “price” of terrorism as such has no financial equivalent unlike goods and services which are traded in the market and whose price is determined by the equilibrium between supply and demand. On the one hand, it can be equated with the economic costs that terrorists face to execute an attack. These may include not only the actual financial outlays for inputs such as weapons and explosives, information, etc. but also the risks of failure of attacks leading to capture of recruits. On the other hand, the price (or value) of a terrorist act is determined by the benefit incurred of a successful attack. Authors such as Enders, Sandler or Frey remain rather unspecific about the determinants of this value. Phillips (2005) in contrast, attempts to shed light on its actual composition through employing a model of equilibrium asset pricing. In this model, the “price” or better value of a terrorist attack equals the amount of political influence that the agent procures (through terrorism) discounting for the risk aversion of terrorists. Both (political influence and risk aversion) are dependent on the prevailing level of security of the terrorist target: the value of an attack will be higher in a low state of security and lower when the system is in a high state of security. In other words, Phillips (2005) concludes that the terrorists’ resource endowments are more valuable to the risk-averse terrorists in times of low security and less valuable in times of high security. Thus ultimately, Phillips (2005) arrives at the same policy conclusions than Enders & Sandler (2006).

⁴⁷ Even though the relation between economic deprivation and suicide bombers is not unambiguous, in the case of Chechnya for example, the preference to commit suicide rather than to stay alive becomes rational considering the destitution and despair that especially women face who have lost their husbands and/or male family and for whom death constitutes an actual relief if not the only future (Napoleoni, 2003).

Given the assumptions of terrorists as rational agents, the various policy measures which were outlined in Section 5 will influence relative costs and resource endowments of terrorists and thus derive different response reactions.

6.1.2 Defensive policies

a) Protecting targets against attacks

Protecting targets aims to raise the costs of an attack by increasing the difficulty for terrorists to strike and reach their target and by increasing the risk of failure (Enders and Sandler 2006). Activities may include the instalment of surveillance technology and placement of security personnel such as the introduction of metal detectors at airports in the 1970s or the fortification of embassies. Legal measures at national, regional or international level, which lead to tightening of legal action taken against terrorists, have conceptually a similar effect. Ultimately, all these actions aim to motivate terrorists to refrain from their terrorist activities in favour of other political means.

Enders & Sandler (2006) analyse the effects of some protective measures empirically, including the introduction of metal detectors at airports, the fortification of US embassies and the passing of international conventions. They show that metal detectors to decrease skyjackings have proven effective insofar as they reduced the number of skyjackings by 12.2 incidents per quarter. However, rather than actually reducing terrorist activity, the introduction of metal detectors appears to have motivated a shift of terrorist attention from now more costly skyjackings towards relatively “cheaper” hostage takings, indicated by an increase of 3.68 incidents per quarter of the latter (*ibid*). In contrast, international conventions⁴⁸ do not show to have had a significant effect on terrorist attacks, since these conventions do not as such reduce terrorists’ resource base or lower the relative costs of non-terrorist activities (*ibid*).

However, continued attempts to target for example major airports such as Heathrow, who since 9/11 have seen a decisive increase in security measures, contradict the prediction that terrorists will seek the weakest link to minimise costs. It appears that they are willing to pay

⁴⁸ These conventions include for example the UN Convention on the Prevention and Punishment of Crimes against Internationally Protected Persons (1973) and the UN Resolution against Taking Hostages (1985) and other conventions against hijackings.

higher prices and take on greater risks for a potentially higher return on a more prestigious target.

b) Mitigating impacts

A complementary action to protecting targets is the mitigation of actual impacts, which in theory does not raise costs but aims to lower the benefits resulting from a terrorist attack (Enders & Sandler, 2006). Frey (2004) suggests two measures to reduce the benefits derived from terrorist acts: decentralisation and changes in media reporting practices.⁴⁹ Decentralisation or “poly-centricity” aims to make targets less attractive by reducing their physical size, and their political and economic importance for the overall. Thus, decentralisation decreases the level of immediate inter-dependency and consequently the degree of damage that can be inflicted.

Changes in media practices on the other hand, rest on the recognition that media and terrorism live in a certain “symbiosis” (Enders & Sandler, 2006): a terrorist event is a welcome story to the media to report on and boost sales; on the other side, terrorists rely on the media as the medium to increase the audience of an attack beyond the directly implicated victims, and to instil the intended fear in society. As the media determines the “cognitive experience” of terrorism by an audience larger than the directly affected victims, and magnifies the impact through continuous reporting of the topic (even at the expense of other topics) it plays an important role in “managing citizen” fears either positively or negatively (Kunreuther 2002). Empirically, Nelson and Scott (1992) who analyse the relation between media and terrorism, show that media coverage may induce additional terrorist acts. However, even if this positive relationship is significant, no prove exists that a reduction in media coverage and subsequent reduction in benefits creates disincentive enough to actually reduce the number of terrorist events. In fact, it should be assumed that terrorist organisations can find their own means of publicising their successful attacks, not least through the medium of the internet, which has become a popular terrorist platform.

Overall, no empirical study exists that shows the relation between reducing the benefits of an attack and its consequences on future terrorist attacks. Therefore, it is left to speculation, that

⁴⁹ Neither of these approaches remains uncontested but a detailed discussion of their implications surpasses the scope of this document and is not necessary for the actual core argument.

terrorists are likely to change their modes of attack, to increase their effectiveness and therefore undermine measures to mitigate the impacts of an attack.

In summary, protective measures seem to induce a suite of substitution effects, which include a shift in targets, a change in the modes of attack, geographic transference between countries or in time (Llusa and Tavares 2006). This implies that theoretically, in order for policies to be effective they will need to address all possible modes of attacks, on all targets, in all possible countries, at all times. Given asymmetric information between terrorists and governments this however is hardly possible to achieve. This leads back to the question how to protect an economic system when the actual threats to security are unknown.

6.1.3 Proactive policies

a) Targeting symptoms of terrorism

Proactive policies include measures such as employing intelligence and surveillance technologies to detect terrorist activity and capture perpetrators, the obstruction of terrorist financial flows and weapons supplies, as well as retaliatory strikes or pre-emptive attacks. Beyond physical measures they can also include the tightening of legislation and curbing of citizen rights to increase difficulties for terrorists to organise, disseminate their information, recruit members, etc. In short, pre-emptive measures, targeting the symptoms of terrorism in general aim to starve terrorists of their resources, financial, human as well as technological, and disrupt their activities at the source.

The interception of terrorist financing has surely received most attention within the literature analysing the dynamic repercussions of proactive terrorist measures. This is not only due to the dependence of terrorist organisations on financial assets to implement their activities but also due to the possibility to detect terrorist activity through tracing the money trail in the system. Yet, despite the potential elegance of this approach, it has proven difficult to actually implement. First, to effectively freeze assets of terrorists, cooperation between states and the banking sector is required, which given disincentives to disclose information on money transactions has proven difficult to establish (FitzGerald 2004). Second, and for this section more relevant, terrorists have shown to circumvent the freezing of their assets through diversifying their income sources, but also by blurring the traceability of their transactions (Napoleoni 2003; Alexiev 2004; Schneider 2004). Al-Qaeda, the epitome of an elusive terrorist organisation, receive money from sources ranging from private individuals to state

sponsors, covered up as “development organisations” and “charities”. Further, they employ techniques of blurring the traces of their transactions similar to organised crime (Schneider 2004). As a result, stringent measures to severely reduce their assets are said to have failed. Enders and Sandler (2006) liken the activities to curb illicit money flows to a “leaking bucket”, whose success is at best temporary (Addison and Murshed 2005) as terrorists find ways to circumvent regulations.

Apart from the failure to curb financial assets, the economics literature is pessimistic on the effectiveness of aggression to decrease human resources of terrorist organisations. The theory recognises three channels through which proactive measures towards terror organisations could in fact aggravate terrorist behaviour as response: first, aggression, specifically if it reduces freedoms of expression and therefore non-political means to express grievances will make non-terror activities relatively more costly consequently leading to increased terrorist activity (Enders & Sandler, 2006); second, aggression can fuel the legitimacy of terror organisations when their struggle for political rights is answered with a tightening of rights (Frey, 2004); and thirdly, terror organisations may answer with a reorganisation of their structures to evade aggression (Münkler, 2004). Al-Qaeda again provides an essential example: the above mentioned elusiveness of this terror organisation results from their success in decentralising operations, which decreases the actual area of target and increases the independence of its functioning even if key leaders are caught (*ibid*).⁵⁰ Enders & Sandler (2006) provide the case study of the bombing of Libya in 1986⁵¹ to show how aggression against terrorism is answered with further aggression. Their findings show that this retaliatory raid caused an immediate increase to over 38 terrorist attacks per quarter, which subsequently fell yet, remained at 12.7 incidents above the pre-intervention mean rather than reducing terrorist attacks (Enders & Sandler, 2006). Thus, coercive action towards terror organisations appears to result in a zero sum game, which can potentially set off a spiral of violence, or as the literature concludes “deterrence may backfire” (Frey (2002)).

As alternative to aggression, Frey (2004) suggests a few “carrots” to induce terrorists to refrain from terrorist activities. Mindful of legal reprisal that terrorists are likely to face when giving up their illegal actions, he suggests providing avenues for terrorists to leave terrorism.

⁵⁰ Ironically, al-Qaeda has therefore achieved what some economists (e.g. Frey (2004) advise governments to do in order to decrease their target area.

⁵¹ The US attacked targets in Libya as response to Libya's responsibility for the West Berlin night club bombing on 5 April 1986.

Thus, rather than raising the costs of terrorist activities, he calls to lower the price when refraining from the latter. This could be achieved by e.g. providing amnesty or re-socialisation. Positive measures rather than inducing a zero or negative sum-game will at least in theory create a win-win situation where not only targets but also terrorists gain. However, sound empirical proof to test this relationship is so far not available and Frey (2006) himself recognises that his tactics may induce adverse incentives to terrorists, resulting in the exploitation of positive measures and may be considered immoral, particularly by victims of terrorist attacks.⁵²

b) Targeting root causes of terrorism

The last policy approach that remains to be discussed focuses on targeting the actual root causes of terrorism. While the above sections summarised the impacts of policies that target the “permissive factors” (Drakos and Gofas 2006), this section will summarise the literature on the effectiveness of eradicating the actual grievances on which terrorist actions are built to undermine terrorist legitimacy.

The main arguments for targeting root causes of terrorism are derived from literature, which detects a positive relation between economic and democratic development and low terrorist incidences or in reverse, a relation between economic and political deprivation and the rise of terrorism. However, no consensus exists on the actual relation between economic (under-) development⁵³ and terrorist activity. Some empirical research finds a negative relation between the level of economic development and terrorism such as Burgoon (2006) who reveals that several measures of welfare will reduce the incidence of transnational terrorism, with the conclusion that strengthening social policies at home and abroad could serve to combat terrorist violence; or Blomberg and Hess (2005) who find that high income (in combination with democratic institutions and economic openness) can significantly reduce terrorism activity. On the other hand, micro-economic studies show that terrorism is in fact not related to economic deprivation: Krueger and Maleckova (2003) examining the root causes of terrorism in the West Bank and Gaza strip, discover that support for violent attacks is not associated with lower educational and economic status. In fact, based on data of the characteristics of terrorists themselves they show that higher income (and higher education)

⁵² These criticisms have been voiced in a review of Frey (2004) *Stick or Carrot* by Inbar, E. (2006). "Book Review: Bruno S. Frey, *Dealing with Terrorism—Stick or Carrot*." *European Journal of Political Economy* 22(343-344).

⁵³ Note that “economic development” here has to be understood in its widest sense.

does not lead to lower support for terrorism. In a similar vein, Beall (2006) argues that no obvious link can be found between poverty and terrorism: al-Qaeda recruits are not necessarily from poor households.

At least two possible explanations exist for these divergent findings: first, as Blomberg and Hess (2005) argue it is necessary to distinguish between target and source country of terrorism, a differentiation which is rarely advanced in the empirical research. While economic development may reduce terrorism in a host country, a higher level of economic development attracts terrorism in a target country. A second possible explanation entails the need to draw a distinction between different actors of terrorism as will be explained in more detail below. Overall, the policy conclusion that economic development will solve terrorism needs to be treated with caution. Not only as it simply may not solve the grievances but also since different means to arrive at the end “economic development” may even incur new grievances for other factions (Enders & Sandler, 2006). From a different perspective, Enders & Sandler (2006) liken the eradication of root causes to a concession to terrorist demands. As game theory shows, setting a precedence of conceding to demands is likely to trigger new terrorist acts, as they are proven to be successful bargaining tools (Enders & Sandler, 2006; Bolechow, 2005).

Apart from economic grievances, the role of democracy and its relation to terrorism is widely discussed in the literature. Just as economic development democracy plays an ambiguous role in terrorism. Drakos & Gofas (2006) differentiate between the “strategic school”, that argues that terrorism by decreasing the price and risk associated with terror will induce terrorism, and the “political access” school, which claims that democracies will decrease terrorist activity as it provides access to alternative means to express political opinions. Empirical evidence exists for both: Enders and Sandler (2006) based on statistical evidence calculate a 3.5 higher likelihood for terrorism occurring in liberal democracies than elsewhere; in contrast, Li and Schaub (2004) show that democracy may reduce terrorism. Again, there are at least two possible explanations to account for these variations in outcomes: on the one hand, Drakos & Gofas (2006) argue that the positive relationship between democracies and terrorism may simply derive from more accurate reporting of terrorist incidences in democracies. In fact, Drakos & Gofas (2006) show that states which lack democratic freedoms such as free speech and press suffer from what they term “underreporting bias”, the tendency not to report terrorist events. The second explanation relates to the differentiation

between source and target country of terrorism. Blomberg & Hess (2005) find that democratic institutions will significantly reduce terrorism in a source country, though increase it in the target country.

In summary, while actions to drain terrorists of their resources seem to lead to changes in structure and organisation of terror organisations, no conclusion can be drawn regarding the positive or negative impacts of policies targeting the actual grievances of terrorism.

6.1.4 The determinants of the dynamics between security and insecurity

By way of a simplified summary, defensive policies seem to incur substitution effects, changing the mode, target and timing of actual terrorist attacks, while proactive policies, whether benevolent or aggressive, whether tackling the symptoms or causes of terrorism appear to change the structure and organisation of terror organisations. Overall, the theory and available data suggest that in fact, terrorism even if it has not become more frequent, has already and will increasingly a) become more severe, b) shift location towards places with relatively less security measures in place, such as the Middle East and Asia where it also encounters more ready support and c) has adapted its strategies and organisational structures to evade proactive policies. Even though no statistical prove may be available for the latter, al-Qaeda provides an illustrative example how a terrorist organisation can render a high security environment impotent. Thus, human drivers of insecurity such as terrorists create a situation of dynamic insecurity which reproduces uncertainty about the nature of the next event.

The literature predominantly suggests that the relative price of terrorist activities versus non terrorist activities constitutes the key determinant for terrorist responses to terrorist measures. Yet, as the above section has shown, there are several other determinants which although having received less attention appear to be critical:

First, the end of a policy, particularly the differentiation whether to protect targets, counter symptoms or actual root causes appears to be a factor in defining terrorist reactions to security measures. However, it is questionable whether in fact the actual determinant is the objective of the policy or rather the means employed to achieve these ends.

Irrespective of the actual goal (e.g. democracy in Iraq), the tools employed to reach this goal have proven to trigger potentially strong (negative) reactions. Essentially, the literature

identifies negative repercussions from aggressive policies, and the possibility of a spiral of violence. Benevolence, in contrast, implies at least in theory a positive sum game or a win-win solution for both terrorists and targets (Anderton and Carter 2005). However, no empirical evidence exists that demonstrates this positive relation. Yet, at the most basic level, there is widespread agreement that terrorism requires economic and political not military solutions.

Ultimately, the responses to security measures are determined by the actual preferences of the terror agents themselves. The summary above has shown that the simple model of terrorism behaviour may be correct in its essence (terrorists as rational agents), yet, it is too simplistic and requires extension to fully account for all possible reactions:

First and foremost, Anderton & Carter (2005) highlight that the reactions as modelled by e.g. Frey (2006) or Enders & Sandler (2004) assume a specific set of preferences, but especially assume substitutability of terror with non-terror acts. Anderton & Carter's (2005) model which incorporates Slutsky's differentiation between income and substitution effects between different goods, highlights that only if terror and non-terrorist means to achieve political objectives are substitutes, a decrease in the relative costs of non-terror means will induce a shift towards the latter. As long as the actual cross price elasticity, (or in plain words, the preferences of terrorists to change their activities in response to changes in prices) are not known, the impact of price changes cannot be predicted with certainty. In a similar vein, Addison and Murshed (2005) contend that the motivation of terrorists is key to understand reactions to response measures. In a simplified model, Addison & Murshed differentiate degrees of militancy suggesting that more militant terrorist members will be less easily deterred from violent means than less militant terrorists.⁵⁴

Applying this framework to different players of terror organisations, it is possible to differentiate between three agents who are likely to differ in degrees of militancy and thus motivation:

Terrorist leaders are likely to fall into the category of the more militant terrorist actors as understood by Addison & Murshed (2005). Consequently, unless their respective grievances

⁵⁴ To illustrate this differentiation, while a more militant terrorist may have exclusively political objectives, a less militant actor may support the activities not only for political purposes but also for economic gain (through e.g. selling weapons, information, or other goods and services). With increased deterrence or alternative income opportunities, the latter may give up his political objectives in order not to jeopardise the economic gain.

are addressed they will seek to circumvent security measures most ardently in favour of terrorist means. Their elasticity to substitute terrorism with non terrorist action is likely to be small if not zero or even negative.

Terrorist recruits could have less militant motivations, i.e. they may be driven by other (e.g. economic) factors than merely political goals. Therefore, a price change in the possible alternatives may be more successful in changing their terrorist inclinations. Thus it is possible to hypothesise that their elasticity to substitute terrorism for non terrorist action is likely to be greater than zero. Within the group of terrorist recruits, Frey (2004) makes the important distinction between terrorists already part and potential future terrorists. While disincentives to choose terrorist activities have to be created for the latter, specific incentives for the first have to be created in order to enable them to renounce their violent behaviour (*ibid*).

Terrorist support groups are agents not directly involved in the actual planning and execution of terrorist acts but those who provide material, mental and financial support to terrorist organisations. As they often constitute the constituencies terrorists are fighting for, their support and in reverse targeting to reduce their support can be of significant importance. It is difficult to estimate their preferences but since they are not directly engaged in terrorist activities themselves, their political objectives could weigh less than other considerations be they economic or any other. Therefore it could be inferred that their demand for non terrorist action is more price elastic.

Furthermore, it is necessary to consider individual terrorist groupings that may not be directly part of a terror organisation but organise and implement attacks in line with a specific terrorist organisation as has been witnessed with al-Qaeda splinter groups. While the literature recognises this phenomenon of the loose network structure of al-Qaeda (for example Reuter, 2004) in general at least no economic literature was found that analyses this phenomenon more explicitly.

Last but not least, the outcomes of the analysis of response reactions are determined by the indicators used to measure terrorist actions. Most knowledge on terrorist trends and patterns is based on data measuring the frequency and severity of terrorist attacks, as the only indicator of change. However, it is impossible to conclude with certainty that a change in number and severity of attacks provides the best indicator for a change in terror activity. In contrary, a prolonged period of time without a terror event does not necessarily mean the ceasing of terror activity; a large scale strike could be in preparation. In other words, impressions of the

nature of change are limited to the available indicators, yet these may not be the most representative for the real degree and nature of terror activity.

6.2 Limitations in the existing literature

Given the dynamic nature of terrorism outlined above, the conclusion “we know that we don’t know” appears suitable, especially as comparatively little empirical information exists to substantiate the theoretical analysis of the dynamics of insecurity. In this light, the effort of Enders & Sandler (2006) is even more commendable in advancing the state of the art on the dynamics of terror and providing an important set of “stylised facts” on the interactions between actors of security and insecurity.

The fundamental problem persisting in this field of security economics is the lack of datasets that provide deeper information on the activities of terror organisations. Without this data, motivations to intensify or refrain from terrorist activities reflected in above mentioned cross price elasticities cannot be quantified, and thus ultimate effects not derived. Knowledge, and especially data gaps become apparent in three major areas: a) data on the motivations and behaviour of individuals, be they leaders, followers or supporters; b) data on the underground activities and dynamics of terror organisations and c) information of the relative significance of other factors that influence terror organisations.

6.2.1 Preferences and motivations of individual terrorists

Little data and thus information are available on the respective motivations and preferences of different groups of terrorists. As has been pointed out above, preferences to substitute activities differ across individuals potentially determined by their degree of “militancy”. Economists have been “guilty of neglecting these preferences of terrorists” in their analysis (Addison & Murshed, 2005) thus producing knowledge based on too simplistic assumptions which may provide stylised facts of terrorist behaviour, yet, are of limited usefulness to actually analyse the impacts of policy measures.

6.2.2 Organisations’ behaviour

At a more aggregate level, there is little information to identify patterns of emergence, evolution and cessation of terror organisations. Even though terrorism is treated in much of the analysis as a monolithic entity, no information exists whether the assumption of common

patterns of terrorism is applicable, or whether in fact, the dynamics of terror activities vary between different terror organisations and should thus be treated case by case. Again, the major problem lies in the lack of data that allows the statistical characterisation of terrorist organisations.

6.2.3 Interactions

Last but not least, solid knowledge on the relative significance of the different factors which influence terror dynamics is lacking. Terror responds to a variety of factors exogenous to actual security measures, including actors and actions on the “official” visible political scene (host and target states, support communities, etc) as well as actors of the invisible criminal scene (other terror organisations, organised crime, etc).⁵⁵ Terror organisations are therefore embedded in a web of interrelations which jointly determine their resource endowments and an analysis of the cost impacts of security measures has to take these inter-relations into consideration again not just to provide stylised facts of terror but more meaningful conclusions on the impact of security measures.

⁵⁵ Enders & Sandler (2005) highlight the reaction of terrorism on previous terror attacks as part of the explanation of the cyclical nature of terrorist attacks. Drakos & Gofas (2006) provide a little more detail, identifying two effects: a) addictive contagion, which implies that the level of terrorism in one country tends to replicate its past behaviour (in other words, if terrorist activity was above the long run average in year 1, chances are high it will be above the long run average in year 2); and b) infectious contagion, which implies that terrorism in one country can induce terrorism in its neighbouring countries. Both groups of authors explain this based on cooperation between terrorist groups who will not only transfer capabilities and technology between each other but will also reap economies of scale through joint training and other activities.

7 KEY FINDINGS OF THE LITERATURE SURVEY

The analysis of the existing literature provides insights first regarding the direct and indirect impacts of terrorism on the economy and second, on current gaps in the knowledge which require further research in the future.

With respect to the first, the survey derives the following nine key findings.

1. The impacts of terrorist attacks vary with the nature and target of the attack but also with the maturity of an economy. While mature well diversified economies seem to be able to absorb the shock of an attack, terrorist attacks can have significant negative impacts on small less diversified economies.
2. It is not only terrorist attacks but the threat of terrorism which incurs impacts on the economy in the form of security measures that economic agents at all levels take.
3. Although empirical evidence is scant the literature suggests that these security measures can have significant economic repercussions at both macro- and micro-economic level.
4. Appropriate policy decisions are critical to contain the negative impacts of actual terrorist attacks and the fear of future attacks which terrorism instils.
5. Given political and economic inter-dependencies, economic repercussions of both terrorism and security measures can stretch beyond national economies.
6. Thus, globalisation has on the one hand enhanced the resilience of economies to large scale shocks while on the other has increased the vulnerability of economies and economic agents to be implicated in the repercussions of initially local events such as a terrorist attack.
7. Terrorists adapt their activities and strategies to changed levels of security with repercussions on the future nature of attacks and their consequent economic impacts. The literature argues that terrorism in response to security measures has become more severe; shifted to relatively more permissive locations (such as the Middle East and Asia); and has decentralised its organisational structures to evade proactive policies as illustrated for example by the elusive network structure of al-Qaeda.

8. Given this dynamism of human-induced insecurity more attention should be paid to “systemic resilience” to buffer against unknown future risks.
9. Since terrorism is only one element within a larger “portfolio of risks” it should not be treated in isolation but linkages with other forms of (human induced) insecurity should be identified and synergies between counter measures where possible exploited.

Second, the above survey has generated key findings regarding future research needs to fill critical knowledge gaps which currently create obstacles to informed policy and decision making. These research gaps can be summarised into the following six points:

1. The available empirical literature focuses largely on the macro-economic outcomes rather than understanding the underlying processes that lead to these impacts. Particularly little is known about the structure and behaviour of terror organisations, with the consequence that only limited conclusions can be drawn about the impacts and effectiveness of security measures to reduce terrorism.
2. The security economics literature focuses on the negative impacts caused by perpetrators but rather neglects impacts resulting from responses to terrorism. As the literature survey shows, economic impacts of terrorist events are transient in large economies but can be extended due to security reactions of targeted agents. Yet, no detailed research is available that studies the actual responses of economic agents to terrorism. Related to this, no aggregate analysis exists, that studies the macro-economic consequences of security measures on economies.
3. Further, the literature is heavily biased to impacts of terrorism in industrialised countries, even though it is shown that a) most terrorism is occurring in relatively less developed countries, b) economic development in less developed economies can be negatively affected by both terrorism and security measures and c) there may be a relation between economic grievances and terrorist activities in terror host countries. Thus understanding the dynamics of terror in small economies may prove critical for the understanding of insecurity in the EU.
4. Terrorism and counter-terrorist measures are often analysed in isolation in the literature, although this form of insecurity represents only one element in a larger “portfolio of risks” which includes other factors of insecurity such as organised crime and conflicts. Further, there are several indications of substantial conceptual and

practical overlaps between diverse threats to security which should be analysed within an integrated framework of the “human drivers of insecurity”.

5. Much knowledge is based on theoretical reasoning with only limited and highly fragmented empirical evidence to substantiate the theory. The major cause of this gap is the restricted availability of data not only of terrorist behaviour but also of the behaviour of targets and their governments.
6. Last but not least, up to today only little of the academic research has been turned into readily available policy knowledge.

8 RESEARCH NEEDS AND RECOMMENDATIONS

As the analysis of the available literature and its limitations shows, relatively more knowledge on the economic repercussions of terrorism exists at aggregate macro-economic level, at the expense to understand underlying processes at micro-economic level. Yet, in order to manage impacts, it is critical to comprehend the underlying drivers. Given the intricate relation between terrorism and response reactions of targets more information is required to grasp the dynamic behaviour of both terrorists as well as targets, to understand how they relate to and interact with each other. Thus, research in the following two fields of enquiry is necessary:

8.1 The structure and behaviour of terror organisations

Knowledge on the actual dynamic behaviour of terrorists is limited and further research in three inter-related areas is needed:

1. The motivations and preferences of individual terrorist actors, differentiating between leaders, recruits and supporters. At the most basic, it is mandatory to know who terrorists are, why they engage in terrorism and what factors determine their choices between terrorist and non-terrorist actions. In addition, the dynamics and interrelations between these actors need to be understood, especially how terror organisations find legitimacy within their support constituencies and how leaders and recruits interact and relate to each other. An issue which has not been studied, yet, which is highly relevant particularly in relation to the legitimization of terrorist groupings, is the economic role terror organisations play in their host countries at macro- as well as micro-economic level. As mentioned above, Hamas for example plays a significant role in health provision in Gaza and the West Bank (Hilsenrath 2005) thus bestowing a substantial social and economic benefit potentially in return for support and legitimacy. Thus, apart from the impacts of terror attacks, the economic repercussions of terror activities needs to be better understood.
2. The dynamics of terror organisations as whole, patterns of their emergence, evolution and cessation; particularly the last has not been studied from an economics perspective.
3. As terrorist organisations do not work in isolation more information is necessary on their relations and dynamics with official political actors (host and target states as well

as their supporting constituencies) and more difficult, their interactions with other actors of violence and crime, e.g. other terrorist groups and organised crime.

Overall, knowledge of specific terrorist organisations and actions needs to be strengthened in order to identify whether aggregation across terrorist behaviour is legitimate, or to what extent terror organisations, their causes, dynamics and thus the remedies against them have to be approached on a case by case basis. The most important task within this research field is the collection of data that is able to characterise terrorists and terror organisations in more detail. Lack of available data will also be the main constraint to advance this area of research. Yet, at the same time it should be recognised that much research on specific terror organisations has been done in other academic disciplines. A first step towards a more differentiated economic analysis could be to incorporate this data and information where possible, if not for statistical analysis so at least to attempt to revise too simplistic models and conceptualisations of terrorist organisations and behaviour.

8.2 The structure and behaviour of targets of terrorism

The analysis of the economic repercussions of terrorism is biased towards identifying costs incurred by perpetrators at the expense to understand how sub-optimal response reactions extend these economic impacts beyond the actual attack. Although the theory and some empirical studies show that response reactions of economic agents to terrorism will have significant economic repercussions there is little knowledge what these response reactions and their impacts in practice are. A pressing research need is therefore to identify how economic agents react to terrorism (across Europe) what the determinants of these response reactions are and how negative economic impacts of these response reactions could be contained.

Particular emphasis should be placed on the “fear factor” which has been mentioned above. As Enders and Sandler (2004) point out, it is difficult to estimate the total effects of terrorism without understanding the dynamics of “fear”. Given that much consumer and producer behaviour is determined by their respective perception of risk and security a more rigorous analysis is required that assesses not only how fear impacts on behaviour but especially what determines the perception of risk and security. This analysis should shed light to what extent public security measures and the media re-enforce perceptions of risk, rather than an actual terrorist event itself.

8.3 The economic impacts of terrorism

Even though macro-economic impacts of terrorist action are relatively better understood than micro-economic processes, this knowledge is still insufficient especially with regards to its geographic coverage. Overall, available research has focussed on impact analyses in a few selected case studies of industrialised countries at the expense to understand economic impacts of terrorism in low and middle income countries. Thus, Enders & Sandler (2006) point to the need for a more encompassing cross-country analysis of the economic impacts of terrorism. Particular focus needs to be placed on impacts on small, less developed economies, not least as many of these provide potential breeding ground for future terrorists, and a relation between terrorism and economic grievances may exist. This cross country analysis should shed light on how impacts on a comprehensive set of indicators vary with the nature of the terrorist event but especially how they vary across different sized economies.

To be able to contextualise the magnitude of terrorism and thus, the significance, its impacts should be compared to conceptually similar events. Tavares (2004) provides a first attempt comparing terrorism to natural disasters and financial crisis. This effort should be extended to a more comprehensive analysis.

Further, given the inter-dependence of the current economic system, spill over effects of terrorism between neighbouring countries require more attention, asking how terrorism in one country will impact on economic activity, growth and development in neighbouring countries. Spill over effects could be of particular interest in the context of the EU, identifying to what extent events in one country will impact on other member states and how EU integration can buffer against an escalation of an attack.

8.4 The economic impacts of security measures

In contrast to the economic impacts of terrorism, the economic impacts of security measures at macro-economic level are hardly understood. Building on the information gained through the analysis of response reactions at micro-economic level, the economic repercussions of security reactions, positive and negative, should be quantified. This analysis should account for the overhead expenditures on security technologies, but also for the wider repercussions on efficiency and effectiveness of economic processes and thus economic growth.

Regarding potential positive impacts certainly more information has to be generated to assess the economic opportunities arising from the security industry. Just as the “green technologies” sector, the security industry is emerging as a niche market – yet, so far not sufficient knowledge is available on the EU’s comparative advantage, competitiveness and thus its overall economic opportunities. At a more general level, the economic analysis of the impacts of terror and security measures should incorporate a more thorough distributional analysis of “winners” and “losers” of terrorism not only within but also across economies.

Regarding the negative impacts, a more rigorous approach to quantify the relative costs arising from different security measures is required. Importantly, this has to consider not only the costs arising within the country implementing these measures but also negative externalities for countries maintaining economic relations with countries implementing security measures. For similar reasons as mentioned above, specifically the economic impacts of security measures on developing countries should be evaluated.

At a more overarching level, more research is necessary to answer the pertinent question, how to secure an economy against “unidentified” shocks. This relates to the idea that the ultimate objective should focus to enhance systemic resilience rather than aim to protect single targets against specific threats. Overall, a more rigorous understanding on the relation between internal security and economic development is needed. Specifically, information is required whether there are real trade-offs between economic competitiveness and growth or whether a synthesis between the two could be created leading to “secure growth”. In this respect, it is necessary to identify to what extent security against terrorism could enhance security against other threats and insecurity, thus, creating positive externalities.

8.5 Conceptual ground work

Beyond the empirical ground work that needs to be done, further advances at a conceptual level are necessary. At various points in the report, it has been argued that terrorism and respective counter measures have been largely studied in isolation. Yet, terrorism is only one element in a suite of different security threats, which have to be analysed in integrated fashion. This includes comparing the structure and behaviour of terror organisations within a larger context of (organised) crime; identify how economic impacts compare to other forms of human induced security and whether synergies between different security measures could be created.

8.6 Data collection and methodologies

Last but not least, the availability and reliability of data has been recognised as a key constraint to the study of the economics of terrorism. The dataset ITERATE for example, which many studies rely on is based on the news coverage of terrorism attacks. Thus, a) it cannot account for signs of terrorism not related to a specific event and b) it excludes events which the media does not consider worth reporting on or is restricted to report on due to limited political freedoms (Tavares and Llussa, 2006). On the other hand, official records or records compiled by terrorist groups themselves are likely to be censored or truncated to serve political objectives, an effect which has been studied by for example Drakos (various) as the “underreporting bias”, as has been mentioned above. Thus, improved data collection and management is of critical importance. In the case of the EU, some data is available, yet no comprehensive database on terror incidences seems to exist or is accessible for European researchers with the result that they have to rely on datasets generated by the US. The efforts made in the US should not be replicated, but rather complemented by identifying new and improved indicators to measure the level of terrorist activity and security besides the simple mean of counting terror acts. In other words, innovative indicators to measure security, insecurity and their mutual repercussions on the economy should be part and parcel of further EU research. In this context, a necessary precondition is an EU-wide agreed definition of terrorism and terrorist acts, which ensures that comparable data is collected across all EU member states.

Apart from improved data collection improved methodologies are required to measures especially non-monetary economic impacts of terrorism. Frey & Lüchinger (2004, 2005) and Frey, Lüchinger & Stutzer (2006) have surely advanced the state of the art by employing contingent valuation techniques to account for the non-economic impacts of terrorism. Yet, these techniques are not without their limitations and further approaches should be explored to capture previously unaccounted economic and non-economic costs and benefits of both terrorism and terror counter measures.

8.7 Policy relevant knowledge

Specific to the EU policy making, a comparative analysis of national, European and global economic security policies could be useful. Pertinent questions which should be addressed

include a) different aspects and categories of security policies as pertaining to different levels of policy making and their respective institutions (national – regional (e.g. EU) – global (e.g. UN, WTO) b) the identification of (qualitative) criteria against which different types of security policies will be analysed and compared c) an assessment to what extent different types of policies can complement or contradict each other – thus identifying sets of policies creating synergies and analysing how different policies may counteract each other at different levels (e.g. national versus EU versus global level) d) an analysis, which actor is best placed to provide respective types of policies, here not only differentiating between levels of policy making but also between public and private providers of security. Given the dynamic interaction between security and insecurity, this analysis should also incorporate an evaluation of potential long term dynamics regarding future terrorist behaviour.

Given the inter-dependence of security, a particular point which warrants attention is to what extent agreement persists between EU member states on the importance and methods to counter terrorism, or in reverse to what extent the effectiveness of security policies could be undermined by member states unwilling to cooperate. This analysis should include an assessment of the relative repercussions of common security policies that each member state faces.

9 EUROPEAN RESEARCH CAPACITY IN THE ECONOMICS OF SECURITY

Terrorism and its counter measures are a cross-boundary phenomenon. Causes and consequences of terrorism and security measures are not confined to a politically or economically defined territory. At the same time, terrorism is experienced differently across the various EU member states: while to some the problem is virtually unknown, others have or are experiencing domestically motivated forms of terrorism, while again others face the threat of the new global terrorism. Similarly, the political, social and economic consequences of terror counter-measures will impact differently in each member states. Thus, understanding terrorism and the opportunities and repercussions of anti-terror measures requires taking a pan-European if not global approach that takes these different perspectives into consideration.

This in combination with the identified knowledge gaps leads to the question whether Europe currently holds the necessary research capacity to address this suite of research challenges which have been outlined above. Research capacity, i.e. the capacity to produce innovative knowledge and information, is dependent on three groups who influence the quality and quantity of research: first, the individual researcher who generates knowledge, second, the research community comprising the sum of individual researchers, who exchange information, pool knowledge, review outputs and thus cooperate to generate high quality information efficiently and effectively; and third, the end users of research who require knowledge for learning and informed decision making. Thus, beyond the capabilities of researchers themselves, research capacity is determined on the one hand by the research infrastructure which allows researchers to cooperate and collaborate with each other; and on the other by the institutional set-up. This set-up supports the generation of applied knowledge according to end user needs without dictating the research agenda, leaving researchers to pursue the necessary groundwork on which applied research can be built.

Consequently, assessing EU research capacity needs to take three inter-related elements into consideration:

1. The availability of high quality researchers at present as well as in the future.

2. The quality of the research infrastructure, i.e. institutions and facilities that allow for networking, collaboration and quality control between researchers across the European Union.
3. The institutional set-up (or the relations between researchers and end-users) mainly reflected in allocation of funding and facilities which ensures that knowledge creation is guided by end-user needs without restraining the space for researchers to shape and develop their field of research.

9.1 Excellence of researchers

The US is often taken as point of comparison or benchmark to evaluate the research competitiveness of the European Union. The key difference between US and European security economists lies in their focus of research: US economists have engaged in research on trans-national fundamentalist terrorism in general and al-Qaeda in particular even before 9/11 (Shapiro 2004).⁵⁶ In contrast, European economists studying terrorism have in the past focussed on the repercussions of nationalist and extreme left- and right-wing terrorism in a few selected countries (e.g. Greece, Spain) and have only recently turned their attention towards trans-national fundamentalist terrorism. Consequently, until today there is no research analysing the economic repercussions of trans-national terrorism and security measures for European countries individually and the EU as a whole. Table 9-4 provides a list of the most important economists who have engaged in the economic analysis of security and terrorism.

Most European economists pursue the study of terrorism as a sub-topic within their respective areas of research. They address terrorism and its repercussions within their respective fields of interest but are not as such specialised in the economics of security or terrorism. Hence, these economists rarely communicate with each other across their sub-disciplinary boundaries, preventing economies of scale in security economics to be realised. Furthermore, many of these researchers are likely to “return” to their standard non-security research agenda after publishing one or two articles on the economics of security from their individual sub-disciplinary perspectives. Those academics concentrating on the subject of terrorism are not economists but belong to various other disciplines such as sociology, politics, international

⁵⁶ This is not surprising considering that the US has been the target of al-Qaeda and fundamentalist terrorism already before the attacks on the World Trade Centre, although mostly outside its state territory.

relations, criminology and law. In contrast, there are a few US economists who especially in recent years have dedicated their full attention to the economic analysis of terrorism, such as W. Enders, T. Sandler, or S. B. Blomberg, whose individual lists of refereed publications on terrorism and other activities far exceed the activities of any EU security economist.

Nevertheless, even if economists in Europe show less commitment to the topic of terrorism, the quality of research equals the quality generated in the US, judging by the quality of their respective publications. Both US and European economists publish mostly in the same journals such as *Defence and Peace Economics*, the *Journal of Conflict Resolution*, the *European Journal of Political Economy*, etc.

Further, even if not a single European economist alone may cover the same ground as one of these US specialists, Europe could reach a similar depth and breadth cumulatively. Yet, the geographic dispersion of security economists currently poses a major obstacle to take full advantage of the available research potential in Europe. This distance and the resulting lack of cooperation between security economists has until now resulted in an unbalanced approach to tackle the various issues and research questions of the field as the analysis has shown. European security economists have focused predominantly on the analysis of underlying causes and motivations of terrorism and the direct economic repercussions of terrorism attacks in a few selected case studies. The analysis of the behaviour of target populations and the economic repercussions of security measures across economic agents has so far attracted little attention. Further, apart from the political analysis of Europe's role in the international arena to tackle terrorism, research on economic issues at the EU level has not been advanced. Overall, while some areas have been studied in great depth and detail, other areas, specifically concerning EU decision making, have been largely neglected.

Regarding future expertise, there are a few high quality institutions in the EU with dedicated undergraduate and master programmes in security and conflict studies. Yet again, these courses focus mainly on the political or sociological elements of security and terrorism, not placing much attention to the underlying economic issues. Nevertheless, there are several individual researchers who have dedicated their Master or PhD theses to economic aspects of terrorism. However, there is no organised training at the bachelor, master or doctoral level on the economics of security anywhere in the European Union (to our knowledge). This new discipline remains highly specialised and isolated attracting only relatively few individuals.

In conclusion, there is a growing number of isolated research economists spread across Europe and many sub-disciplines who jointly could address the remaining knowledge gaps and advance the state of the art. Establishing a European security economics discipline would require a communication and cooperation mechanism that ensures that previously disconnected economists can pool their expertise, avoid duplication of research efforts and address gaps in current knowledge efficient and effectively. Overall, there is not yet an established European research community dedicated to the study of security economics.

9.2 Research infrastructure

The geographic and sub-disciplinary dispersion of researchers and the scale of the task, particularly addressing trans-boundary and European level issues of insecurity and security, require strong cooperation between individual researchers. There are a large number of research centres and universities in the European Union who focus on security as a main theme or who devote departments or projects to security-related research bringing together researchers from across the European Union and various disciplines. Most of these institutions are specialised in the study of conflict or security provision at a more general level, while only one institute focuses on terrorism exclusively. Nevertheless, several institutions have in the past or present allocated funds and time to the study of terrorism, either as stand-alone projects or within a larger programme of terrorism research (see Table 9-1). Again, this terrorism research focuses mainly on the origins and causes of terrorism and activities and adequate policy responses, with issues of international relations and foreign policy receiving most attention. Thus, most researchers who are cooperating through these institutions are experts in of politics, sociology or public policy.

In contrast, the economic analysis of security or terrorism hardly features on the research agenda of these institutes. Congruently, economists are mostly absent from staff lists of these institutes and their projects. Economists might cooperate on a small scale working and publishing in teams of two to three experts mostly from the same institutions. However, an overarching network for an academic exchange of ideas or cooperation mechanism for collaborative research does not exist in the economics of security. Consequently, the current experts in security economics are working in isolation not only from other ongoing programmes and activities but also from each other.

One of the reasons for this lack of a focussed research community on the economics of security relates to the lack of security- or terrorism- related data collection or data infrastructure. This inhibits new research on security economics as outlined above. However, it also prevents divergent researchers from crystallising around such infrastructures as users and developers. Typically, such data collection projects must be based at a research institute or a university to provide continuity. Also they require long-term funding to enable the build up of long and comparable data series. Once such data are collected, researchers can gather around this project and start cluster, build critical mass and establish networks.

There are first attempts at European Level to enhance the collaboration of security economists, specifically through the 7th Framework Programme. This funding mechanism not only places security economics explicitly on the research agenda but also makes the cross-country collaboration of economists compulsory for the successful application of projects. Yet, without the actual institutionalisation of a coordinating mechanism this collaboration is unlikely to last beyond project duration. In other words, unlike in the United States which has several institutes focusing on security economics (see Table 9-3), there is currently not a single centre or institute in Europe dedicated to the study of security economics.

Thus, security economics faces the same problem as research in general as identified by the European Commission in 2002 (COM(2002)565): research activities across the European Union are fragmented suffering under the lack of coordination which could avoid duplication of efforts and address knowledge gaps more efficiently and effectively. In order to take full advantage of the research capacity of individual security economists two critical steps are necessary: first, to enhance the collaboration between security economists across the European Union and second, to link security economists to existing research centres to ensure that economics can draw from and complements other disciplines of security research.

9.3 Institutional set-up

Last but not least, European research capacity is dependent on the relations between research community and end-users who determine the salience of the research subject and will influence research capacity through the allocation of funds. In this respect, it is necessary to consider the importance that is placed on security economics by the EU as well as its individual member states.

At EU level, the European Security Research Advisory Board (ESRAB) has explicitly recognised that “economic theory in particular can offer key insights, enabling governments to optimise their efforts to enhance security and growth” (ESRAB 2006: 59). Building on this insight, Seventh Framework Programme (FP7) recognizes not only the role of security as research programme but dedicates funds explicitly to the area of “security economics”. The European Forum for Security Research and Innovation (ESRIF) that will replace the ESRAB may build on these first steps and further promote security economics with a view to support informed policy making.

Yet, this first step to promote security economics as a discipline and to increase its visibility in policy circles is undermined by the limited attention paid to the subject at the national level. National security research programmes provide a good insight of the limited importance attributed to security economics across EU member states. At the time of writing, only nine out of 27 EU members have introduced an explicit security research strategy to guide and coordinate their research activities in this field.⁵⁷ These strategies focus on technological aspects and solutions to enhance security and counter the threat of terrorism. Apart from Austria, who has made the integration of humanities and social sciences into all security research mandatory, and Germany where humanities and social science issues may be integrated into technologically oriented projects, national security research strategies do not recognise the importance of social sciences in general and economics in specific for the advance of security research. Even where the importance of social acceptability of security policies is explicitly mentioned no separate funds are allocated independently to foster the enquiry of social sciences in general or economics in specific into security. This limited interest of EU member states in security economics creates another obstacle to the advance of security economics as a newly emerging research discipline in Europe. In the US most security research appears to be privately funded, and consequently, an aggregate figure on dedicated funds is not available. Given that until today private funding in the EU has not been channelled into this research area, the role of governments is even more important.

⁵⁷ These nine countries include Austria, The Czech Republic, Estonia, Finland, France, Germany, the Netherlands, Poland and the UK.

9.4 Assessment and recommendations

In summary, even though Europe holds a significant research potential in security economics in the form of a small number of highly skilled economists who are interested in this field, the current research framework and institutional set up create obstacles to take full advantage of this potential. The urgency is reflected in the fact that a number of security economists from Europe and its neighbours prefer to work in the US rather than in Europe.⁵⁸ Consequently, even if security economics has been assigned importance under the 7th Framework Programme, this will remain temporary and unsustainable if not additional actions are undertaken to improve the current research infrastructure and to anchor and institutionalise security economics in European and national research strategies. Three actions should be taken

First, at the European level a network of experts in the economics of security and terrorism should be established. An important point of departure could be to build on the available research capacity embodied in those economists who have up to today devoted time and effort into the subject. Building on the 7th Framework Programme a European network of security economists should be institutionalised to foster coordination and cooperation between economists across the European Union. This could also enhance the recognition of security economics at the national level, foster the relation between researchers and end-users, and promote security economics as discipline to a new generation of researchers and academics.

Strengthening cooperation between security economists in Europe will enhance the research potential that is currently scattered across Europe. Such a network of security economists should analyse the causes, organisation and consequences of European and global terrorism from an economic point of view; and improve the design and the evaluation of anti-terror policies using analytical and empirical economic techniques. Beyond research and policy advice it should foster and enhance training and capacity building across Europe. Importantly, the network should grow over time and reach out to other relevant disciplines which endeavour to understand the causes and consequences of security and insecurity. Given that the problem of terrorism is not confined to Europe, cooperation could be extended to incorporate economists and researchers beyond Europe.

⁵⁸ Security economists which have migrated to work in the US include internationally acclaimed academics such as Alberto Abadie, Claude Berrebi, Massimo Guidolin.

Second, we recommend for the European Union or its member states to consider establishing a research centre or institute dedicated to the economics of security and terrorism. Such a European Centre would compete directly with similar US centres for research. On the one hand such centre could provide the research infrastructure needed to advance the data situation to enable downstream applied research on security economics. On the other hand, it could provide a unique European perspective on terrorism and security policy, which is likely to differ significantly from the perspectives and approaches practiced in the United States.

Third we recommend for national European governments to include security economics in their security research programmes and in their general research funding bodies as a distinct and independent research area. Important conceptual and empirical insights can be expected from such research which will yield advances in basic research and in policy making. Thus, security economics as a discipline should be funded due to its own inherent benefits as outlined in this study, and not as a top-up component in technology-driven, industrially oriented research programmes. Given the public good nature of research findings in security economics, the private sector cannot be expected to provide funding for such research. As with all other research excellence in terms of expected research outcomes should be the guiding principle in allocating research funding in this discipline.

Table 9-1

Research centres in the European Union working on security economics

Institute	Department	Programme / Project	Focus	Discipline	Sector	Activities
AUSTRIA						
University of Vienna	Institute for Risk research		Inter- disciplinary risk research focusing mainly on technological / industrial risks (e.g. nuclear, GM, etc)	inter-disciplinary	University	research / teaching
Austrian Institute for International Relations			“Comprehensive Security” and international relations; specific project regarding infrastructure protection	inter-disciplinary/politics	Private	Research / Policy
BELGIUM						
Centre for European Policy Studies (CEPS)	EU Neighbourhood, Foreign and Security Policy	European Liberty and Security: Security Issues, Social Cohesion and Institutional Development of the European Union (ELISE)	European Security policy, selected projects focus on European Liberty and Security, Transparency and Effectiveness of EU Foreign Security Policy	IR/Politics	Private	research / policy / networking
International Crisis Group		International Terrorism Project	address longer-term issues, to building sustainable international defences against terrorism (stable states and regions, addressing underlying grievances) focus on interests and responsibilities of major powers, how they interact with those of the states and regions in question.	Politics	private	research
DENMARK						
Danish Institute for International Studies	Defence and Security	1. Terrorism 2. Defence and Security	1. radicalisation in Europe 2. explain and understand the ways in which armed force and terrorism is used with the aim of enhancing our ability to prevent, manage and end the use of armed force and terrorism => interest in economics but no economists!	Politics / IR	University	research / training

Institute	Department	Programme / Project	Focus	Discipline	Sector	Activities
FRANCE						
Sciences Po	Ceri - Centre for International Studies and Research	Challenge - Liberty & Security	The CHALLENGE project responds to widespread concerns about the resort to specific illiberal practices by contemporary liberal regimes. These practices are linked with the identification of increasing insecurities globally, insecurities that are widely interpreted as obliging sterner policies from the authorities and, consequently, new constraints on principles of liberty under law and presumptions about the innocence of individuals. Specifically, the project examines tensions created by claims that 'security is the first freedom' and that a new 'balance' has to be established to manage the global scale of contemporary dangers.	Politics / IR	university	Research / training
GERMANY						
Institute for Peace Research and Security Policy at the University of Hamburg	Centre for European Peace and Security Studies		Opportunities for enhancing the European Union's responsibilities in the area of peace and security policy. In particular, ZEUS analyses the EU's global role in peace and security issues with respect to relevant areas of policy and the Union's formal and practical relations with NATO and the UN, the USA and Russia, and key regions for European security,	Politics / IR	University	research / teaching
Bonn International Centre for Conversion			Arms, peace building and conflict and cross-cutting issues such as governance, human security	inter-disciplinary (including economics)	Private	research
Arbeitsstelle Friedensforschung Bonn (AFB) Peace Research Information Unit Bonn (PRIUB)			Workshops & discussions to promote mediation between academic peace research and political administration and civil society; producing AFB-INFO, a peace research newsletter; information service through website		private	policy / networking
German Institute for Economic Research (DIW Berlin)	Department of International Economics	Development and Poverty; European Integration	The role of violent conflicts, wars and fragility at the micro-level as a key factor for underdevelopment and poverty. Policy recommendations for economic recovery in the post-war period. European security economics and policy analysis	Economics	Public	Research / policy advice / networking

Institute	Department	Programme / Project	Focus	Discipline	Sector	Activities
Institut für Terrorismusforschung und Sicherheitspolitik			Research on the development of national / trans-national terrorism and extremism and its consequences on society, economy and politics.	history / politics	private	research, outreach,
POLAND						
Center for International Relations		Migration and Homeland Security Programme	Issues that concern the development of the European area of freedom, security and justice (AFSJ) and Poland's role within it amongst other things: European Security and terrorism – the Polish perspective	politics	private	research
SPAIN						
Centro de Investigacion para la paz		Transnational Terrorism	analyses of causes and characteristics of global terrorism and consequences on personal freedom and human rights.	politics	private	research / policy / networking
SWEDEN						
International Peace Research Institute (SIPRI).			Euro-Atlantic, Regional and Global Security, Arms, etc.. security at various levels (national, global) functional issues, e.g. business and security	politics / IR	private	Research / Data
UK						
University of Birmingham	Centre for Studies in Security and Diplomacy	New Security Challenges Programme	CSSD's geographic focus is on states and regions undergoing radical political and social change. The Centre's strategic heartland is the nexus of democracy and democratic practice, good governance and the rule of law; security and justice. It is action and solution based, looking for sustainable outcomes.	politics/IR	University	research / teaching
Centre for Defence and International Security Studies	European Security & Transatlantic Relations	Global Terrorism and Transnational Organised Crime	political, diplomatic, economic and legal aspects of combating global terrorism and organised crime. Areas of interest include: Sources of terrorism, organisation & methods; Areas of transnational organised criminal activity; Co-operation or co-ordination of legislation, law enforcement and intelligence within the EU; Co-operation in the wider Europe and globally	Interdisciplinary	private	research / policy

Institute	Department	Programme / Project	Focus	Discipline	Sector	Activities
Garnet Network of Excellence, Global Governance, Regionalisation, & Regulation, the role of the EU		Global and Regional Security Governance: Security Threats and Institutional Response	policy issues in global governance: problems in the governance of trade, finance, security, environment, technology, development, social production and gender inequality, disease; the role of the EU in the advancement of research and policy in themes (i)-(iii)	Interdisciplinary	private	developing a multi-dimensional, multi-disciplinary network of scientific excellence of researchers
Chatham House		Europe / International Security	The International Security Programme produces policy-orientated research into and analysis of issues important to the new security agenda. Europe Serves as a forum for research and debate on questions of politics, economics and security in Europe.	politics / IR	private	research / policy
University of Bradford	Department of Peace Studies	International and Regional Conflict and Security	Research area Political Violence and Terrorism Challenges of political violence and terrorism; preventing, reducing and combating terrorism; interrelationships between terrorism, poverty and alienation; strategies and tactics of groups using political violence and terrorism; terror and conflict relating to specific contexts (including Chechnya, Pakistan & South Asia; Middle East, Iraq, Horn of Africa); examination of 'war on terror' and its implications.	Inter-disciplinary focus on politics, IR, sociology	university	research / teaching
International Institute for Strategic Studies		Terrorism and Counter-Terrorism	Threats and threat perceptions, state and non-state actors involved in conducting or supporting terrorism, and, ultimately, how members of the international community can align strategies and foster effective cooperation to help counter terrorism (also cost aspects!)	Politics / IR / public policy	private	research / policy

Table 9-2

Selected research centres in EU associate countries working on security economics⁵⁹

Institute	Department	Programme / Project	Focus	Sector	Other activities
NORWAY					
FAFO		New Security Programme	social conditions of conflict, interaction between the economy and conflict / the Economies of Conflict	private	research / policy / network
International Peace Research, Institute, Oslo (PRIO)		Security Programme	interdisciplinary research projects focusing on the ways in which individual states, the European Union and the United Nations respond to various security challenges, while at the same time exploring new approaches that do not emphasize the state as primary referent of security	private	research / policy / network
Norwegian Institute of International Affairs (NUPI)	International Policies	Terrorism and international crime	Failed states and growth of terrorism and international crime; Terrorism and crime towards shipping and oil activity; Terrorist networks; relationships between corruption and organised crime; relationships between political terrorism and profit-oriented crime; terror, security policy and response; conditions in the Middle East that create and sustain terrorism; right-wing extremism; nuclear terrorism and the non proliferation of fissile materials. mainly politics	public	research

⁵⁹ Countries associated with the EU include those having applied for EU candidacy, EEA countries (Norway) and countries with an association agreement (Israel, Switzerland).

Institute	Department	Programme / Project	Focus	Sector	Other activities
SWITZERLAND					
Centre for Research in Economics, Management and Arts (CREMA)			promotes scientific research in economics, management and the arts, based on the rational choice approach and on insights from the neighbouring social sciences (in particular psychology, sociology and law).	Private	Research / teaching
Swiss Federal Institute of Technology Zurich	Centre of Security Studies		Research in the fields of international and Swiss security policy from a political and historic perspective	university	research / teaching
Geneva Centre for Security Policy			Challenges to Peace and Security, including WMD proliferation, terrorism, threats to human security and migration; Global and Regional Issues Conflict; Management and Peace building; Geopolitical Implications of Globalisation	public	research / policy / training / networking
ISRAEL					
Institute for counter-terrorism			Provide expertise in terrorism, counter-terrorism, homeland security, threat vulnerability and risk assessment, intelligence analysis and national security and defence policy	public	research / policy / networking / data

Table 9-3

Selected major research centres in the US working on security economics

Institute	Department	Programme / Project	Focus	Sector	activities
UNITED STATES					
World Policy Institute		Counterterrorism Project	Explores history, attitudes and aspirations of both the leaders of these nations and their citizens and presents a number of alternate models designed to ensure the future security and balanced economic development of the region.	university	research
Brookings Institute	Defence / Economics	Homeland Security	Border security; Cost distribution of Homeland security; Emergency incident response; Government organization; Internal defence; Preventive efforts; Other	private	research
Wharton University of Pennsylvania	Risk management and decision processes centre	Terrorism Insurance	Multidisciplinary approach to terrorism insurance / financing	university	research / training
National Bureau of Economic Research (NBER)		Economics of National Security	wide range of issues that affect national security with a primary focus on the security of the United States	private	Research
US Homeland Security Centre	Centre of Risk and Economic Analysis of Terrorism		developing computer models to analyze the risks, consequences, emergency response, and economics of terrorism	public	research
Economists for Peace and Security			US Military and Security Policy; International Peace building; Teaching the Economics of War and Peace and new projects given certain criteria	NGO	research/ policy / networking
Georgetown University	Centre for Peace and Security Studies		Non-Military Aspects of Security; Conflict and Conflict Resolution; Technology & Security; Arms and Arms Control; The United States and International Security	university	research, teaching

Institute	Department	Programme / Project	Focus	Sector	activities
RAND Corporation	Terrorism and Homeland Security		Terrorism research and analysis (since 1970s)	private	research / policy / teaching
	RAND Centre for Terrorism Risk and Management Policy		Terrorism insurance, Terrorism liability, Compensation, Security, Terrorism Risk Management		

Table 9-4

List of key EU security economists

Surname	First name	Institution	Country	Terror related focus
Addison	Tony	UNU/WIDER	Finland	Causes and consequences of conflict
Azam	Jean Paul	University of Toulouse	France	Economics of Conflict and Redistribution including Civil War, Violence against Civilians, Looting and Terror, Terrorism, Sanctions, Conflict Prevention, State Formation;
Barros	Carlos P.	Instituto Superior de Economia e Gestão Technical University of Lisbon,	Portugal	Defence economics: terrorism (Islamic and ETA terrorist groups); Efficiency of defence industries.
Brück	Tilman	German Institute for Economic Research (DIW Berlin)	Germany	Terrorism, conflict, war, reconstruction
Brzoska	Michael	BICC	Germany	arms trade, arms production, peace and defence economics and development policy.
Dihel	Nora	OECD	Europe	Trade, security related impacts on trade
Drakos	Konstantinos	University of Patras	Greece	Economics of Terrorism / Terrorism Modelling
Esteban	Joan	Universidad Autonoma, Barcelona	Spain	regional economics, polarization poverty/inequality, conflict
FitzGerald	Valpy	Oxford University	UK	Terrorist financing

Frey	Bruno S.	University of Zurich	Switzerland	Impacts of terrorism and counter-measures
Gardeazabal	Javier	Universidad del Pais Viasco	Spain	economic impacts of conflict and terrorism
Hartley	Keith	University of York	UK	Defence Economics
Hoeffler	Anke	Oxford University	UK	Conflict, Failed States
La Ferrara	Eliana	IGIER	Italy	Development Economics, Economic impacts of conflict
Lenain	Patrick	OECD	Europe	Economic consequences of terror
Lüchinger	Simon	University of Zurich	Switzerland	Consequences of terror and counter-terror measures
Michel-Kerjan	Erwann	Laboratoire d'Économétrie, École Polytechnique, Paris	France	Financial management and large scale risks including terrorism
Mirza	Daniel	University of Rennes	France	Trade, impacts of counter-measures on trade
Murshed	S. Mansoob	Institute of Social Studies	Netherlands	Economics of Conflict and Peace
Nitsch	Volker	Free University, Berlin	Germany	Trade and Terrorism amongst others
Schneider	Friedrich	Johannes Kepler University, Linz	Austria	Shadow economies, terror financing

Suder	Gabriele	CERAM Sophia Antipolis European School of Business	France	Impact of European Economic Integration, risk management within regional integration
Tavares	Jose	Faculdade de Economia Universidade Nova de Lisboa	Portugal	Economics of Terrorism
Wolfelsperger	Alain	Professeur, Institut d'Etudes Politiques de Paris	France	Political economy of terrorism

10 BIBLIOGRAPHY

- Abadie, A. and J. Gardeazabal (2003). "The Economic Costs of Conflict: A Case Study of the Basque Country." American Economic Review, 93(1): 113-132.
- Addison, T. and M. Murshed (2005). "Transnational terrorism as a spillover of domestic disputes in other countries." Defence and Peace Economics 16(2): 69 - 82.
- Alexander, D. and Y. Alexander (2002). Terrorism and Business: The Impact of September 11, 2001, Transnational Publishers.
- Alexiev, A. (2004). "Ölmilliarden für den Dschihad. Saudi-Arabien finanziert den globalen Islamismus." Internationale Politik February: 21-28.
- Aly, H. Y. and M. C. Strazicich (2000). Terrorism and Tourism: Is the impact permanent or transitory? Time series evidence from some MENA countries. Columbus, Ohio, Ohio State University, Department of Economics
- Anderton, C. H. and J. R. Carter (2005). "On Rational Choice Theory and the Study of Terrorism." Defence and Peace Economics 16(4): 275 - 282.
- Auerswald, P., Branscomb, L. M., La Porte, and T., Michel-Kerjan, E. (2005). "The Challenge of Protecting Critical Infrastructure." Wharton Working Papers 05-11.
- Azam, J.-P. (2005). "Suicide-bombing as inter-generational investment." Public Choice 122(1): 177–198.
- Baily, M. N. (2001). Economic policy following the terrorist attacks. Washington DC., Institute for International Economics.
- Beall, J. (2006). "Cities, Terrorism and Development." Journal of International Development 18(1): 105-120.
- Beall, J., Goodfellow, and T., Putzel, J. (2006). "Introductory Article on the Discourse of Terrorism, Security and Development." Journal of International Development 18: 15-76.
- Beck, U. (1992). Risk society: towards a new modernity. London, Sage Publications.
- Becker, G. and Y. Rubinstein (2004). Fear and the Response to Terrorism: An Economic Analysis, Mimeo.
- Bellany, I. (2007). "Terrorism: Facts from Figures." Defence and Peace Economics 18(2): 101 - 112.
- Berman, E., and Laitin, D., (2005). "Hard Targets: Theory and Evidence on Suicide Attacks." NBER Working Paper No. 11740
- Berrebi, C. and E. F. Klor (2005). "The Impact of Terrorism Across Industries: An Empirical Study", C.E.P.R. Discussion Papers, CEPR Discussion Papers: 5360.
- Blandford, D. (2002). The agricultural economics of terrorism: Markets in peril, international trade dimensions. Annual meeting of the American Agricultural Economics Association, Long Beach, CA.
- Blomberg, S., and G. Hess (2005). The Lexus and the Olive Branch: Globalization, Democratisation and Terrorism, Claremont College Mimeo.
- Blomberg, S. B., Hess, G. D. and Orphanides, A. (2004). "The Macroeconomic Consequences of Terrorism." Journal of Monetary Economics 51(5): 1007-1032.
- Blomberg, S. B. and A. Mody (2005). "How Severely Does Violence Deter International Investment?" mimeo.

- Bram, J., Orr, J., and Rapaport, R., (2002). "Measuring the effects of the September 11 attack on New York City." Economic Policy Review(November): 5-20.
- Brookmeyer, R. and N. Blades (2003). "Statistical Models and Bioterrorism: Application to the U.S. Anthrax Outbreak." Journal of the American Statistical Association 98(464): 781-788.
- Brown, J. R., Cummins, J. D., Lewis, C. M. and Wei, R. (2004). An Empirical Analysis of the Economic Impact of Federal Terrorism Reinsurance, NBER Working Papers: 10388.
- Brown, J. R., Kroszner, R. S., and Jenn, B., (2002). "Federal Terrorism Risk Insurance." NBER Working Paper, No 9271.
- Brück, T. (2004). "An Economic Analysis of Security Policies." Defence and Peace Economics 16(5): 375-389.
- Brück, T., (ed), (2007). The economic analysis of terrorism. Abingdon, Routledge.
- Brück, T. and B.-A. Wickström (2004). "The economic consequences of terror: Guest editors' introduction." European Journal of Political Economy 20: 293-300.
- Buehler, K. S. and G. Pritsch (2003). "Running with risk. It's good to take risks—if you manage them well." McKinsey Quarterly 2003(4): http://www.mckinseyquarterly.com/article_page.aspx?ar=1351&L2=5&L3=5.
- Burgoon, B. (2006). "On Welfare and Terror: Social Welfare Policies and Political-Economic Roots of Terrorism." Journal of Conflict Resolution 50(April): 176-203.
- Caplan, H. (2003). "War and Terrorism Insurance: Plans for Long-Term International Stability and Affordability." Geneva Papers on Risk and Insurance: Issues and Practice 28(3): 426-447.
- Chalk, P. (2001). Terrorism, Infrastructure Protection, and the US Food and Agricultural Sector, RAND.
- Chalk, P. (2005). Trends in Terrorism: Threats to the United States and the Future of the Terrorism Risk Insurance Act, RAND Centre for Terrorism Risk Management Policy.
- Chen, A. H. and T. F. Siems (2004). "The Effects of Terrorism on Global Capital Markets." European Journal of Political Economy 20(2): 349-366.
- Cohen, J. S., Mintz, A., Stevenson, R. and Ward, M. D., (2003). Defence Expenditures and Economic Growth in Israel: The Indirect Link. The economics of conflict. Volume 3. Case studies. T. Sandler and K. Hartley, Elgar Reference Collection. International Library of Critical Writings in Economics, vol. 168. Cheltenham, U.K. and Northampton, Mass.: Elgar 387-398.
- Coolsaet, R. and T. Van de Voorde (2006). "The Evolution of Terrorism in 2005, A statistical assessment." Universiteit Gent, Department of Political Science Research Paper.
- Coughlin, C. C., J. P. Cohen, and Kahn, S. R. (2002). "Aviation security and terrorism: a review of the economic issues." Federal Reserve Bank of St. Louis Review 84(5): 9-24.
- Council of the European Union (2002). Council Framework Decision of 13 June 2002 on combating terrorism. 2002/475/JHA.
- Council of the European Union (2005). The European Union Counter-Terrorism Strategy. <http://register.consilium.europa.eu/pdf/en/05/st14/st14469-re04.en05.pdf>, November
- Cowan, R., and Foray, D., (1995). "Quandaries in the economics of dual technologies and spillovers from military to civilian research and development." Research Policy 24: 851 - 868.
- Crenshaw, M. (2007). "Explaining Suicide Terrorism: A Review Essay." Security Studies 16(1): 133-62.

- Cummins, D. J., and Lewis, C., (2003). "Catastrophic Events, Parameter Uncertainty and the Breakdown of Implicit Long-Term Contracting: The Case of Terrorism Insurance." The Journal of Risk and Uncertainty 26: 153-178.
- Cummins, J. D., Doherty, N., and Lo, A., (2002). "Can Insurers Pay for the 'Big One'? Measuring the Capacity of the Insurance Market to Respond to Catastrophic Losses." Journal of Banking and Finance 26(2-3): 557-83.
- Department of Foreign Affairs and Trade (2004). Combating Terrorism in the Transport Sector Economic Costs and Benefits, Australian Government.
- Dixon, L. and R. Reville (2005). National Security and Compensation Policy for Terrorism Losses. Catastrophic Risks and Insurance. OECD, Proceedings: Policy Issues in Insurance, no. 8. Paris and Washington, D.C.: 59-71.
- Dolnicar, S. (2005). "Understanding barriers to leisure travel: Tourist fears as a marketing basis." Journal of Vacation Marketing 11(July): 197-208.
- Downes-Le Guin, T. and B. Hoffman (1993). The Impact of Terrorism on Public Opinion, 1988 to 1989, RAND Corporation.
- Drakos, K. (2004). "Terrorism-Induced Structural Shifts in Financial Risk: Airline Stocks in the Aftermath of the September 11th Terror Attacks." European Journal of Political Economy 20(2): 435-446.
- Drakos, K. and A. Gofas (2006). "The Devil You Know but Are Afraid to Face: Underreporting Bias and its Distorting Effects on the Study of Terrorism." Journal of Conflict Resolution 50(October): 714-735.
- Drakos, K. and A. Gofas (2006). "In search of the average transnational terrorist attack venue." Defence and Peace Economics 17(2): 73 - 93.
- Drakos, K. and A. M. Kutan (2003). "Regional Effects of Terrorism on Tourism in Three Mediterranean Countries." Journal of Conflict Resolution.
- Eckstein, Z. and D. Tsiddon (2004). "Macroeconomic Consequences of Terror: Theory and the Case of Israel." Journal of Monetary Economics 51(5): 971-1002.
- Eisinger, P. (2004). "The American City in the Age of Terror: A Preliminary Assessment of the Effects of September 11." Urban Affairs Review 40(September): 115-130.
- Eldor, R. and R. Melnick (2004). "Financial Markets and Terrorism." European Journal of Political Economy 20(2): 367-386.
- Enders, W. and T. Sandler (1991). "Causality between transnational terrorism and tourism: The case of Spain." Terrorism 14(1): 49-58.
- Enders, W. and T. Sandler (2002). "Patterns of Transnational Terrorism, 1970-1999: Alternative Time-Series Estimates." International Studies Quarterly 46(2): 145-165.
- Enders, W. and T. Sandler (2005). "After 9/11: Is It All Different Now?" Journal of Conflict Resolution 49(2): 259-277.
- Enders, W. and T. Sandler (2005). "Economic Consequences of Terrorism in Developed and Developing Countries: An Overview", Mimeo.
- Enders, W. and T. Sandler (2005). "Transnational Terrorism 1968-2000: Thresholds, Persistence and Forecasts." Southern Economic Journal January.
- Enders, W. and T. Sandler (2006). The political economy of terrorism. Cambridge, Cambridge University Press.

- Enders, W., T. Sandler, and Parise, G. (1992). "An Econometric Analysis of the Impact of Terrorism and Tourism." Kyklos 45(4): 531-54.
- Ericson, R. V. and A. Doyle (2004). "Catastrophe Risk, Insurance and Terrorism." Economy and Society 33(2): 135-173.
- ESRAB (2006). Meeting the Challenge. The European Security Research Agenda, Brussels.
- European Commission (2006). Terms of Reference, Tender JLS/D1/2006/10. Brussels.
- Evans, R. G., J. M. Crutcher, Shadel, B., Clements, B., and Bronze, M. S. (2002). "Terrorism from a public health perspective." American Journal of the Medical Sciences 323: 291-298.
- Fielding, D. (2003). "Counting the Costs of the Intifada: Consumption, Saving and Political Instability in Israel." Public Choice 116(3-4): 297-312.
- FitzGerald, E. V. K. (2004). "Global financial information, compliance incentives and terrorist funding." European Journal of Political Economy 20: 387-401
- Fleischer, A. and S. Buccola (2002). "War, Terror and the Tourism Market in Israel." Applied Economics.
- Frey, B. S. (2004). Dealing with terrorism stick or carrot? Cheltenham, Elgar.
- Frey, B. S. and S. Lüchinger (2002). "Terrorism: Deterrence May Backfire." European Journal of Political Economy 20(2).
- Frey, B. S. and S. Lüchinger (2005). Measuring Terrorism. Law and the State: A Political Economy Approach. A. Marciano and J.-M. Josselin, New Horizons in Law and Economics series. Cheltenham, U.K. and Northampton, Mass.: Elgar: 142-181.
- Frey, B. S., S. Lüchinger, and Stutzer, A. (2004). "Calculating Tragedy: Assessing the Costs of Terrorism." Institute for Empirical Research in Economics, University of Zurich Working Paper Series 205.
- Frey, B. S., S. Lüchinger, and Stutzer, A. (2006). "The Life Satisfaction Approach to the Value of Public Goods: The Case of Terrorism."
- Glaeser, E. L. and J. M. Shapiro (2001). "Cities and Warfare: The Impact of Terrorism on Urban Form." NBER Working Paper Series 8696.
- Goldstein, J. (2006). Terror attacks influence driving behaviour in Israel. The Mathematics of Public Security, Austrian Academy of Sciences, Vienna, Austria.
- Hilsenrath, P. (2005). "Health Policy as Counter-Terrorism: Health Services and the Palestinians." Defence and Peace Economics 16(5): 365 - 374.
- Hobijn, B. (2003). "What Will Homeland Security Cost?" Economic Policy Review 8(2): 21- 33.
- Hoffman, B. (1998). Inside Terrorism. New York, Columbia University Press.
- Hogarth, R. (2002). Insurance and Safety after September 11, 2001: Coming to Grips with the Costs and Threats of Terrorism, Department of Economics and Business, Universitat Pompeu Fabra, Economics Working Papers.
- Hooke, R., Agens, G., and Chambers, I. (2006). Civil aerospace in the 21st century - Business as usual ... or a fresh start?, Price Waterhouse Cooper.
- Human Security Centre (2005). The Human Security Report. Vancouver, University of British Columbia.
- Human Security Centre (2006). Human Security Brief. Vancouver, University of British Columbia.
- Hummels, D. (2002). Time as a trade barrier. mimeo.

- Hyams, K. C., F. M. Murphy, and Wessely, S. (2002). "Responding to Chemical, Biological, or Nuclear Terrorism: The Indirect and Long-Term Health Effects May Present the Greatest Challenge." Journal of Health Politics, Policy and Law 27(2): 273-291.
- Janusz, A. (2005). Versicherung gegen Terrorismus: Das Beispiel des US-amerikanischen Terrorism Risk Insurance Acts 2002, Hausarbeit im Seminar: Terrorismus & Ökonomie. Lehrstuhl für Allgemeine Betriebswirtschaftslehre, insbesondere Finanzwirtschaft und Kapitalmarkttheorie, Europa Universität Viadrina.
- Keyfitz, R. (2004). "U.S. Consumers and the War in Iraq." Business Economics 39(2): 18-23.
- Kivimaeki, T. (2003). "Terrorism in Southeast Asia." Nordic Institute of Asian Studies Asia Insights 3 (September).
- Kleindorfer, P. R. and G. H. Saad (2005). "Managing Disruption Risks in Supply Chains." Production and Operations Management Society.
- Commission of the European Communities (2002). The European Research Area: Providing new momentum. Strengthening - Reorienting - Opening up new perspectives. COM(2002) 565.
- Krueger, A. B. and J. Maleckova (2003). "Education, Poverty and Terrorism: Is There a Causal Connection?" The Journal of Economic Perspectives 17(4): 119-144.
- Kunreuther, H. (2002). "Risk Assessment and Risk Management in an Uncertain World." Risk Assessment 22(4): 655-664.
- Kunreuther, H. (2006). "'Catastrophic Risks: Dealing with Interdependencies.'" Mimeo.
- Kunreuther, H. and G. Heal (2003). "Interdependent Security." The Journal of Risk and Uncertainty 26(2-3): 231-249.
- Lacker, J. M. (2004). "Payment System Disruptions and the Federal Reserve Following September 11, 2001." Journal of Monetary Economics 51 (5): 935-965
- Lee, C.-C. and C.-P. Chang (2006). "The Long-Run Relationship between Defence Expenditures and GDP in Taiwan." Defence and Peace Economics 17(4): 361-385.
- Lee, D. R. (1988). "Free Riding and Paid Riding in the Fight against Terrorism." American Economic Review. 78 (2): 22-26
- Lenain, P., M. Bonturi, and Koen, V. (2002). "The Economic Consequences of Terrorism." OECD Working papers 334, Department of Economics, Paris: OECD.
- Leonard, J. S. (2001). Impact of the September 11, 2001 Terrorist Attacks on North American Trade Flows, Manufacturers Alliance E-Alert, Arlington Virginia.
- Lerner, J. (1992). "The Mobility of Corporate Scientists and Engineers between Civil and Defence Activities: Implications for Economic Competitiveness in the Post-Cold War Era." Defence Economics 3(3): 229-42.
- Li, Q. and D. Schaub (2004). "Economic Globalization and Transnational Terrorism: A Pooled Time-Series Analysis." Journal of Conflict Resolution 48(2): 230-258.
- Lichtenberg, F. (1995). Economics of Defence R&D. Handbook of Defence Economics. K. Hartley, and T. Sandler. Amsterdam,, Elsevier. 1.
- Limao, N. and A. J. Venables (2001). "Infrastructure, Geographical Disadvantage, Transport Costs, and Trade." World Bank Econ Review 15(3): 451-479.
- Llusa, X. and J. Tavares (2006). "Economics and Terrorism: What We Know, What We Should Know and the Data We Need." mimeo.

- London Chamber of Commerce (2005). The economic effects of terrorism on London. Experiences of firms in London's business community. London, Press & Public Affairs, London Chamber of Commerce.
- Mansdorf, I. J., and Weinberg, Jacob (2003). "Stress reactions in Israel in the face of terrorism: Two Community Samples." Traumatology 9(September): 155-168.
- Maurer, V. (2007). The European Union and Counter-Terrorism. Zuerich, Centre for Security Studies, ETH.
- McKinsey (2006). An executive take on the top business trends: A McKinsey Global Survey. McKinsey Quarterly http://www.mckinseyquarterly.com/article_page.aspx?ar=1754&L2=21&L3=114&pagenum=1. 2007.
- Michel-Kerjan, E. O. and B. Pedell (2007). "How Does the Corporate World Cope with Mega-Terrorism? Puzzling Evidence from Terrorism Insurance Markets." Journal of Applied Corporate Finance. 18 (4): 61-75
- Mirza, D. T. and T. Verdier (2006). "International trade, security and transnational terrorism: Theory and empirics." CEPR working paper.
- Muenkler, H. (2004). "Terrorismus heute. Die Asymmetrisierung des Krieges." Internationale Politik February: 1-11.
- Naor, Z. (2006). "Untimely death, the value of certain lifetime and macroeconomic dynamics." Defence and Peace Economics 17(4): 343 - 359.
- Napoleoni, L. (2003). Modern jihad : tracing the dollars behind the terror networks. London, Pluto.
- Navarro, P. and A. Spence (2001). "September 2001. Assessing the Costs of Terrorism." Milken Institute Review.
- Nelson, P. S. and J. L. Scott (1992). "Terrorism and the Media: An Empirical Analysis." Defence Economics 3(4): 329-339.
- Nitsch, V. and D. Schumacher (2004). "Terrorism and International Trade: An Empirical Investigation." European Journal of Political Economy 20(2): 423-433.
- Phillips, P. J. (2005). "The 'Price' of Terrorism." Defence and Peace Economics 16(6): 403 - 414.
- Pizam, A. and A. Fleischer (2002). "Severity versus Frequency of Acts of Terrorism: Which Has a Larger Impact on Tourism Demand?" Journal of Travel Research 40(February): 337-339.
- PricewaterhouseCooper (2005). Draft Anti-Money Laundering and Counter-Terrorism Financing Bill 2005. mimeo.
- PricewaterhouseCooper (2007). "10th Annual Global CEO Survey." mimeo.
- Purnell, S. W. and E. S. Wainstein (1981). Problems of U.S. businesses operating abroad in terrorist environments, U.S. Department of Commerce.
- Ram, R. (1995). Defence Expenditure and Economic Growth. Handbook of Defence Economics. K. H. a. T. Sandler. Amsterdam, Elsevier: 251-273.
- Reuter, C. (2004). "Parasiten des Zorns. Wie Al Khaïda neue Akteure rekrutiert." Internationale Politik February: 12-20.
- Richard Sykes (2005). The Defence Industry in the 21st Century, Price Waterhouse Cooper,.
- Russell, T. (2002). "The Costs and Benefits of the Terrorism Risk Insurance Act: A First Look." unpublished (Santa Clara University, Department of Economics).

- Ryans, J. K., Jr. and W. L. Shanklin (1980). "How Managers Cope with Terrorism." California Management Review 23(2): 66-72.
- Sandler, T. and W. Enders (2004). "An Economic Perspective on Transnational Terrorism." European Journal of Political Economy 20(2): 301-316.
- Sandler, T. and K. Siqueira (2006). "Global terrorism: deterrence versus pre-emption." Canadian Journal of Economics 39 (4): 1370-1387
- Schneider, F. (2004). "The Financial Flows of Islamic Terrorism Organisations: Some Preliminary Findings" in: Masciandaro, Donato (ed.), Global Financial Crime: Terrorism, Money Laundering and Offshore Centres, Aldershot (GB): Ashgate Publ.Comp., pp. 97-126.
- Shapiro, J. (2004). Domestic Dilemmas: US Homeland Security Policy and Transatlantic Relations. An American Perspective. European Homeland Security Post-March 11th and Transatlantic Relations. B. Didier, Shapiro, J., Fedorov, A., Brussels, Belgium, Centre for European Policy Studies (CEPS): 15-23.
- Shieh, J.-Y., J.-H. Chen, Chang, Juin-Jen and Lai, Ching-Chong. (2005). "Terrorist Threats and Transnational Dynamics in an overlapping generations model." Defence and Peace Economics 16(6): 415 - 425.
- Stevens, B. (2003). Factors Shaping the Demand for Security Goods and Services. Paper presented at the OECD Forum for the Future on The Security Economy: What Trade- Offs in an Open and Mobile Society?, Paris.
- Suder, G., (ed), (2004). Terrorism and the international business environment: the security-business nexus. Cheltenham, Elgar.
- Sunstein, C. R. (2003). "Terrorism and Probability Neglect." The Journal of Risk and Uncertainty 26(2-3): 121-136.
- Tavares, J. (2004). "The Open Society Assesses its Enemies: Shocks, Disasters and Terrorist Attacks." Journal of Monetary Economics. 51(5): 1039-70.
- Trajtenberg, M. (2004). "Crafting defence R&D in the anti-terrorist era" in: Adam B. Jaffe, Josh Lerner and Scott Stern: Innovation Policy and the Economy. Cambridge, MIT Press.
- Tujan, A., A. Gaughran, Mollett, H. (2004). "Development and the 'Global War on Terror'." Race Class 46(July): 53-74.
- Viscusi, W., K., and R. Zeckhauser, J., (2003). "Sacrificing Civil Liberties to Reduce Terrorism Risks." Journal of Risk and Uncertainty 26(2-3): 99-120.
- Walkenhorst, P. and Dihel, N. (2002). "The Impact of the Terrorist Attacks of 11 September 2001 on International Trading and Transport Activities." OECD Working Paper.
- West, D. M. and M. Orr (2005). "Managing Citizen Fears: Public Attitudes Toward Urban Terrorism." Urban Affairs Review 41(September): 93-105.
- Wintrobe, R. (2001). "Can suicide bombers be rational?" Mimeo.
- Wolgast, M. (2002). "Global Terrorism and the Insurance Industry: New Challenges and Policy Responses." Insurance and September 11(239-253).