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The threat of terrorism: the perspective of a policymaker

Cathérine Müller and Joppe de Ree*

Abstract

This note defines and analyzes the most important issues concerning decisionmaking about human-induced insecurities such as terrorism and organized crime from the perspective of a policymaker. By means of modeling the policymakers trade-off between the effectiveness and costs of policy measures targeted at reducing the threat of terrorism, we aim at helping to understand the role economic research can take to enable efficient decisionmaking in the context of human-induced insecurities in general and terrorism in particular.

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1 Introduction

Insecurities are a challenge to many societies, especially if they involve risks of creating major losses in human lives, property and welfare. Local or national governments are at least partly responsible for the wellbeing of its inhabitants and are therefore supposed to deal with these insecurities. One aspect policymakers are concerned with –and face great difficulties with– is making policy decisions under great uncertainty. The concept of insecurity is quite often associated with great levels of uncertainty. Insecurity can occur naturally (e.g., natural catastrophes), accidentally (e.g., industrial accidents) or purposefully human-induced. In this paper we are mainly interested in the analysis of purposefully human-induced insecurities like organized crime or terrorism. We focus mainly on the issue of terrorism, where the analysis could –in principle– be straightforwardly extended to other types of human-induced insecurities, such as organized crime. In particular we are discussing why economists (as social scientists) should be interested in studying this field and how they can help to improve efficient policy decisionmaking.

Economics as a social science is typically associated with the economy as its area of focus. Economic science and the economy however are not the same thing. Economics as a science is merely a set of methods, techniques and theories that help us understand the working of various areas of the economy, for example individual or firm behavior. The economist's toolbox (methods, techniques etc. that are developed by economic science) however may also be applied to different areas of research that historically have been domains of political scientists, sociologists or psychologists. We argue that issues related to terrorism and organized crime are such research areas.

In this note we are discussing the merit of economic research on issues of human-induced insecurities. We focus on how anti-terror (and anti-organized crime) policymaking can be improved using outcomes of economic research. Policymakers attempt to fight terrorism in a *cost efficient* way. Policymakers aim to effectively tradeoff the threat of terrorism and the monetary cost of anti-terror policy. In section (3) we set up a framework that formalizes the decision process of the policymaker.

By analyzing the policymaker's decision process we identify two broad categories of research in the area of terrorism and organized crime: the interdependencies relating policymaking and terrorism and organized crime on the one hand, and the determination of costs of different types of threats on the other. We are subsequently discussing and classifying some of the existing literature in either of these two classes. With classifying we mean that we analyze how one can

use these results to the interest of a policymaker. Our framework logically identifies gaps in knowledge and the associated data requirements for studying these gaps. Hence, this section also attempts to illustrate where knowledge is lacking and where economics as a science can contribute.

Before moving on to our structural analysis we briefly discuss the concept of human-induced insecurity in a bit more detail. Section (2) attempts to define human-induced insecurities, and to identify the overlap and the differences between terrorism and organized crime as two sources of human-induced insecurities. Both concepts have a decent amount of overlap, but there are also important differences.

2 Defining human-induced insecurities

We define human-induced insecurities as insecurities resulting from action undertaken by agents that result in damage to third person and/or their property. The damage may be inflicted on purpose or accepted as a by product. Terrorism and organized crime are examples of human induced insecurities, but are more narrowly defined. Our definition of human induced insecurity would for example also includes risk of dying in traffic.

There is one key property that sets apart insecurity that is human-induced from natural hazards. Where terrorist's or criminals are continuously interacting with governments, media and the people, nature generally does not change its course in response to human action. It is obvious that there is some degree of interdependency between actors on multiple sides of the action, i.e., the perpetrators (of e.g., the terrorists or the criminals), the victims or potential targets as well as those responsible for security (e.g., governments). The fact that there is interaction and decisionmaking in the system offers scope for economists –as specialists in analyzing strategic behavior in systems– to study these topics.

The following two sections shortly overview the conventional definitions of terrorism and organized crime, that exist in the literature. We add to the definition by arguing that for studying the topic we need to define *the threat(s)* of terrorism as a multidimensional concept.

2.1 Terrorism

There is no clear agreed upon definition of the term "terrorism". The United Nations for example have been struggling with a definition for years. However, a definition widely used in the

economic literature on terrorism is that of Enders and Sandler (1993). According to this definition, "terrorism is the premeditated use - or threatened use - of extra normal violence or force to gain a political objective through intimidation or fear directed at a large audience usually beyond the immediate victims."

Terrorism is of a two-sided asymmetrical nature (Stepanova, 2008). One part of the asymmetry is the state or a group of states, whereas the opponents are terrorist movements or groups which use the targeting of civilians as a "force multiplier" in order to compensate for its otherwise conventional military weakness. There seem to be three key characteristics that distinguishes terrorism from other forms of violence (see e.g., Stepanova (2008), Tavares (2004)). 1. Terrorists (groups) pursue political goals. This distinguishes terrorism from crime, that tends to be economically driven. 2. Terrorists tend to target civilians directly in their attacks. The targeting of civilians distinguishes terrorism from other types of political violence, e.g., guerrilla tactics, or war. 3. Beyond the immediate victims of an attack, terrorists typically target an audience. This audience are the state and other civilians. The state is understood as the ultimate intended recipient of the "message".

2.2 Organized crime

"'Organized crime' is understood to be the large-scale and complex criminal activity carried on by groups of persons, however loosely or tightly organized, for the enrichment of those participating and at the expense of the community and its members. It is frequently accomplished through ruthless disregard of any law, including offences against the person, and frequently in connexion with political corruption" [Definition of the United Nations 1975, 8].

What probably distinguishes organized crime most from regular economic activities, is not only the production and provision of illegal goods and services, but the enforcement of contractual exchange not by laws and courts but the criminal organization itself (Kumar and Skaperdas, 2008). There are various ways from that organized crime can emerge, but they all base on costly and imperfect enforcement of property rights by the state (Kumar and Skaperdas, 2008). The authors distinguish between four possible factors contributing to the emergence of organized crime: geographic distance and inaccessibility from the centers of power (state authority), ethnic and social alienation of groups, power vacuums created by revolutions, wars and major political change, and the prohibition of the production and distribution of certain goods and services by the state.

The prototype for concepts of organized crime is the Italian mafia (Shelley 2005). By corrupting and penetrating state activities, traditional crime groups create collusive relationships with the state. Thus their existence and performance very much depends on the economic development of the state and its financial institutions, even on international financial systems (Shelley 2005). Organized crime groups can engage in three broad social strategies (Cockayne 2007): symbiotic (they coexist with authorities and seek their protection from the law and rivals), parasitic (the groups target authorities not only for protection but also for revenues), and predatory (they prey on authority and state structures).

However, beside the traditional type of organized crime there exists another type which's groups have emerged in conflict zones after the end of the Cold War - new transnational crime groups. They often exploit the disorder of states and regions for their economic purposes and thus have no interest in the conflicts being resolved. Factors that have facilitated their growing appearance are the increasing global economy, free international movement of people and trade, free-market movement of goods, improvements in communication and transportation (Bouloukos et. al. 2003). Often these crime groups are not hierarchically structured like the traditional ones (Shelley 2005).

Many of the newer crime groups are also willing to cooperate with terrorists groups. They might not share the ideological motivations, but they make common cause in exploiting the absence of an effective state (Shelley 2006). There are two theories about the relationship between crime and terror groups (Cockayne 2007): One suggests that terrorist groups resort to criminal means and networks in order to supply and distribute tools and propaganda, and criminal groups might revert to terror groups for enforcement capacities. The other suggests that both might converge on an institutional level (methods of organization, tactics and motivation). However, the relationship between organized crime and terrorism is still neither theoretically nor empirically well understood (Cockayne 2007), and will remain an important subject for further research.

3 What can economists contribute to the field of research on terrorism?

This section is the core of this note. From this point on we are focussing the analysis on terrorism. The framework we introduce could be also used for studying the issue of organized crime. Yet, it requires new definitions of threats.

Given the definition of terrorism we move on to a related concept: the *threats* to society that are associated with terrorism. We argue that the threats associated with terrorism can be broadly classified in three fundamentally distinct groups:

1. *Direct tangible costs of a terrorist incident*. This would represent for example the replacement costs of property damage after a terrorist incident.

2. *Direct intangible 'cost' of terrorism*. This would constitute loss of lives after an attack, but also fear or social tensions in relation to terrorist activity, etc.

3. *Second order effects*. Which would for example be a decrease in economic activity, or a stock-market crash after a terrorist attack (Note that this could be due to increased social tensions or fear).

It is possible that we have not been exhaustive by specifying the above three groups. Yet, for now we are adopting the above concepts of threats.

We define a (random) variable T representing threats of terrorism at some given time and place.

$$T = \begin{pmatrix} \text{Direct tangible cost terrorism} \\ \text{Direct } \textit{in}\text{tangible cost of terrorism} \\ \text{Second order effects} \end{pmatrix} \tag{1}$$

The variable T will be important in the subsequent analysis. T stands for 'threat', as it is the threat of terrorism that makes terrorism –as defined by Enders and Sandler (1993)– as bad (or as trivial) as it is. T is defined to be time t specific in the subsequent analysis (i.e., T_t or T_{t+1}).

To pinpoint the merits of economics research in the field of human induced insecurities or terrorism we are setting up a framework. In this framework we are modeling the policymaker's cost-benefit analysis regarding the fight against terrorism (or organized crime for that matter). Policymakers are faced with the difficult task of allocating resources efficiently in anti-terrorism or anti-crime policy. (Note, that this is a stylized environment. In reality policymakers also have other objectives that may interfere with decisionmaking on anti-terror policy.) We assume that policymakers strive to balance out the risk related to terrorism and the costs of anti-terror policy.

In practice, determining whether risk and costs are in balance is a difficult matter and an open question for debate. With this note we attempt to contribute to this debate. Either way,

policymakers need to identify the 'threats' and how much they cost to society. For analyzing these concepts economic research may be of great help.

3.1 The objective of the policymaker

For making adequate (or efficient) decisions regarding anti-terrorism policy, policymakers face a fairly straightforward cost benefit analysis. We refer to our variable T capturing the three different threats to society. We add the $_{t+1}$ subscript to make the variable time specific. In the subsequent analysis we are considering a two-period horizon. At t all policy decisions are made, and at $t+1$ T_{t+1} materializes. T_{t+1} represents the vector of threats of terror at $t+1$. (We explicitly talk of the threats of terrorism, instead of the threat of a terrorist attack. Society might also bear 'costs' if no actual attack materializes. It is likely that in the years following up on 9/11 the global costs in terms of fear –for example– have increased dramatically.)

T_{t+1} is the materialization of the threat in $t+1$, such that from the perspective of a policymaker living in t we should be uncertain about its actual outcome. Therefore we speak of a random outcome variable. Even though T_{t+1} is unknown in advance, it might still be possible to attach probabilities to certain outcomes of T_{t+1}. Attaching probabilities to outcomes specifies the probability distribution of T_{t+1}.

The fact that T_{t+1} is a random variable does not prevent policymakers from influencing its outcome beforehand. It is therefore perhaps more useful to talk about the probability distribution of T_{t+1} conditional on anti-terror policy (that the respective institutions have decided upon) and the information available to the policymaker at t. For example, policymakers could increase the size of intelligence agencies to decrease the probability of a future terrorist attack. (If anti-terror policy is able to avert a terrorist attack it is likely to have a positive influence on all three concepts of threat.)

A conditional probability distribution function connecting policy measure to probabilities of certain threat level outcomes may be written as follows: $f\left(T_{t+1}\middle|\text{policy}_t\right)$. Policymakers are usually interested in particular properties of the conditional distribution function f. Such properties may be the conditional expectation or perhaps the conditional variance (i.e., the spread) of the outcome variable T_{t+1}. Just for expositional purposes we assume that policymakers are only interested in the expectation (or the expected value) of the threat of terrorism, conditional on its own actions. (So, not on the spread (or variance) of the outcome for example.)

This assumption implies a definition of the one single objective of policymakers living in t in

mathematical form:

$$\min_{\textbf{policy}} \{E\left[c \cdot T_{t+1} \middle| \textbf{policy}\right] + \text{monetary cost of } \textbf{policy}\} \tag{2}$$

We introduce a new concept c representing a vector of the monetary costs associated with the threat vector T_{t+1}. For simplicity we assume that c –the monetary cost of T_{t+1}– is non-stochastic. Policymakers aim to minimize the sum of the expected monetary costs of the treats conditional on their own policy actions, and the monetary costs of (anti-terror) policy, when choosing their policies. The subsequent sections elaborate on equation (2) and identify how economic research could contribute to the policymakers objective.

We could think of the policymakers objective as minimizing the expected *total* cost of terrorism at $t + 1$. The total cost adds up the expected costs of terrorism at $t + 1$ measured in monetary terms, and the investment costs in anti terror policies. Policymakers are interested in minimizing this objective function by choosing anti-terror policy actions. When anti-terror policy actions are chosen in such a way that it minimizes the total costs of terrorism, one says anti-terror policy is efficient (i.e., one additional euro that is spent in anti-terror policy would decrease the costs of terrorism by an amount that is less than one euro. Hence the returns in terms of a expected decrease in threat are lower than the investment costs).

3.2 The job of an economist

Conditional on the policymaker's objective on deterring terrorism –by minimizing the sum of the expected monetary cost of terrorism and the monetary cost of policy actions– economist may use their knowledge to help. We argue that the job of an economist may be twofold. First, economists may use their tools to attach monetary values to the different materializations of the threat level T_{t+1} and hence estimate the vector of costs c. Second, economists can study the dynamics of the system causing T_{t+1}, and may therefore estimate the properties of f, the conditional distribution of T_{t+1}. Economists have developed tools to attach monetary values to non-tangible or partly tangible concepts like terrorism. It is not fundamentally difficult to estimate the replacement cost of a building that has been destroyed in a terrorist's attack (the first entry of T_{t+1}). Yet, calculating monetary losses due to partly tangible effects –like losses of life, social tension, fear– are a lot less straightforward. Economist have developed methods and theories of how to do that.

Thirdly, econometrics has shown its merits in estimating causal effects from non-experimental

data. Econometrics therefore may shed light on the causal relationship between (economic) aggregates like GDP, trade flows or unemployment rates and terrorism. This type of research is necessary to quantify the cost of terrorism c.

We are subsequently interested in attaching probabilities to certain outcomes of T_{t+1}. That is, economists may help understanding the dynamics of the system to subsequently estimate probabilities of certain outcomes. We would be interested for example in how investments in the police force would affect the general perceptions of safety by the population and the actual level of terrorist activity.

3.2.1 Estimating the cost of terrorism

We have modeled the objective of the policymaker as a tradeoff between expected benefits from investing in anti-terror policy and costs of anti-terror policy. For making this tradeoff efficiently we have argued that economists can contribute to the estimation of the monetary costs of T_{t+1} and the probabilities attached to the of the outcome of T_{t+1}. This section is about estimating c as the monetary costs associated with the vector of threats T_{t+1}.

T_{t+1} itself may be interpreted as a cost incurred on society. Terrorism may incur fear related 'costs', or it may incur a 'cost' by increasing tensions between different ethnic groups. But it may also impact on economic aggregates like GDP, trade flows or unemployment rates. This broad definition of costs simply has many appearances. We would think of the direct costs of rebuilding the twin towers after the 9/11 attacks. Obviously the true costs go much further than just these replacement costs. Thousands of people got killed during the incident (not to mention the number of people that got killed during the U.S. lead 'war on terror'), but an even larger group got frightened. Moreover, we could think of more indirect costs as 9/11 might incurred a negative shock to the world economy.

These different broader cost types are hard to compare. What is worse: a one percent increase in the unemployment rate or an increase in self-reported fear levels? We would not have a straightforward way of answering this question. Yet, policymakers make these tradeoffs on a daily basis. The problem with answering such a question is that both concepts are typically measured using different units of quantity. For making policy evaluations, comparing values measured using different units of quantity becomes increasingly difficult. It is like comparing apples and oranges.

The vector of threats also measures 'costs' using different units of quantity. Where replacement

costs of the damaged property can be measured in dollars or euros, wellbeing is often measured using a utility concept. The cost vector c is intended to transform T_{t+1} –that consists of three concepts of threats– into one dollar or euro amount. Translating T_{t+1} by multiplying it with its vector of costs c decreases the dimension from a multidimensional issue (monetary, utility, or other types of costs) to a one dimensional issue (only a monetary cost). Translating the threat of terrorism into one single dollar/euro amount is of great interest to policymakers, as it can be relatively easily compared with investments in anti-terror policy that are also measured in monetary terms. We could say that the cost of terrorism is equivalent to the threat of terrorism T_{t+1}, yet measured in monetary terms, i.e., $c \cdot T_{t+1}$. [1]

It is certainly not easy to attach some monetary value to the loss of lives or to the increased anxiety or fear levels in the country. However, estimating the monetary costs of less tangible issues can be done. Frey, Luechinger, and Stutzer (2008) for example estimate how much income people would be willing to give up to live in areas less prone to terrorism. Their approach relates incomes to the disutility of living in a terrorism-prone area of the world. Their method in the end attaches a euro amount to terrorism. The idea of using utility losses in terms of measuring negative satisfaction can in this framework also be translated into 'measuring' the emotional aspects/effects of insecurities. Risk averse individuals would report higher well-being or life satisfaction in situations without uncertainty/insecurity/and risk than with ambiguities, given all other circumstances being equal.

Furthermore, we would also be interested in estimating the cost of terrorism in terms of reduced economic activity after a terrorist attack. A number of economic studies have been conducted on the consequences of terrorism at the aggregate level and on specific sectors. Terrorist attacks can have very specific consequences on consumption and investment behavior, capital flows and trade across borders, tourism etc. [e.g., Eckstein and Tsiddon (2004), Abadie and Gardeazabal (2008), Drakos and Kutan (2003), Enders and Sandler (1996)]. The direct costs of terrorist attacks on aggregate output are considered relatively low and short-term. However, high and persistent levels of terror and concentrated terror in one region can lead to considerable impacts on economic growth [see Llussa and Tavares (2007) for an overview].

To sum up this section we argue that all of the materializations of T_{t+1} bear costs on society. Either these costs are easily measurable in euro amounts (replacement costs, or shocks to GDP) or they are not (losses of lives, wellbeing, or increased social tension). It is of interest for the

[1] It is also possible that research is focussing on effects, without expressing the effects in terms of euros or dollars, but using some other value of quantity. Comparison with investment in anti-terror policy will consequently be difficult.

policymaker to capture all threats to society in euro amount in order to make them comparable for making efficient policy tradeoffs. We argue that this is one of the two important jobs of the economist in helping to make efficient policy decisions. The second job is equally important and will be the subject of the next section.

3.2.2 Analyzing system dynamics and estimating probabilities

Economics as a social science may help to understand the underlying system dynamics causing terrorism (e.g., motivations of terrorist's). This will answer some important policy questions and hopefully propose clear-cut policy solutions. Clearly, if we better understand the motivations of terrorists policymakers are better equipped to avert their plans. One of the key messages of Alan Krueger's overview on terrorism is that the widely accepted poverty breeds terrorism notion seems to be false (Krueger, 2007). Based on empirical analyses he argues that terrorists are typically middle-income and reasonably well educated. This pattern is found consistently within and between countries. Promoting education therefore may not have the intended effect of down-sizing the pool of potential terrorists. This is a new insight from economic research on terrorism.

Even though there is a lot of criticism on the underlying assumptions of main stream (i.e., neo-classical) economics as a science, it has a proven track record on analyzing many different aspects of the economy for decades (such as labor related issues, economic growth or trade flows, to name a few). People have realized that economics as a science may be also applied to other fields of research (see for example Steve Levitt's and Stephen Dubner's book *Freakonomics* (2005) where they for example study the effects of abortion laws on crime rates in the U.S. (Levitt and Dubner, 2005)). Human induced threats to security may also well-suited to be analyzed within conceptual frameworks that were initially designed to study firms or for analyzing households. Krueger (2007) argues that a terrorist's organization may be studied as if it were a firm. Instead of maximizing profits (as a neo-classical firm would do) terrorist's organizations maximize another objective. Terrorists perhaps maximize exposure that enables them to get their messages across. Similar to a neo-classical firm, a terrorist's organization would keep costs low by trying to hire "workers" that are capable of doing the job they are hired for against minimum costs.

For analyzing a complex world it is often useful to simplify the world into manageable pieces by building models. Modeling offers a way to set the stage for analyzing complex phenomena like the dynamic interaction between governments, terrorists, media and the public. As opposed

to other social sciences (like sociology or psychology) economic science offers a very strong and useful concept: the concept of (general) equilibrium. (General) equilibrium is reached when all parties apply their optimal strategy conditional on the other parties' optimal strategy. (This is in fact a Nash equilibrium.) The equilibrium concept proposes what we might see happening in society and therefore offers a way of testing the underlying assumptions/properties of the model using data. The equilibrium property of neo-classical economic analysis is a powerful tool for testing the validity of theories involving a multiple of interacting agents.

The development of economic models of terrorist's organizations is still in the early stages of development. Economic models used to analyze firms should be tailored to the match the important properties of terrorist's organizations or mafia groups. It is not our intention to propose how economic theorists should go about their business. In this section however, we discuss some of the available economic studies and some of the concepts that are used in terrorism and organized crime. Economic research so far has contributed to understanding structural patterns of association, power structures and activities of organized crime, and determinants of terrorism and its effects in aggregate and on various sectors of the economy, and on individual wellbeing. However, little is known about effects of policies deterring and combating organized crime and terrorism. This is partly due to the lack of data giving information on public spending, risks, and the characteristics of activities. We continue with a somewhat more technical analysis. The analysis facilitates the classification of the existing literature on the causes of terrorism, and subsequently identifies data accessability on explicit counter terror actions as an important issue that frustrates econom(etr)ic research that would be useful to policymakers. However, we also claim that without this particular data a lot of important analyses *can* be done.

Let's assume for the moment we are able to estimate the non-stochastic cost vector c that is associated with the threat vector T_{t+1}. Multiplying costs with threats yields the threat level in monetary terms $c \cdot T_{t+1}$, i.e., how much the (future) state T_{t+1} costs to society in terms of euros. Having estimated the costs vector c is getting us only halfway. Because we are interested in the state of the world at $t+1$ we must know a good deal about the distribution of T_{t+1} (conditional on policy actions). (There is some inherent uncertainty in relation with terrorism. It is the fear of what might happen in the future that makes terrorism into an effective combat tactic.)

To meet the policymakers objective we do not need however full information on the conditional distribution function f. For making efficient policy evaluations we only need an estimate of the expected cost of terrorism conditional on anti-terror policy (represented by: $E\left[c \cdot T_{t+1} \middle| \text{policy}_t\right]$).

The conditional expectation is just the first moment of the conditional distribution function. We can remain ambiguous about other –higher order– moments of f. Econometric models of causes and effects tend to be set up as to estimate conditional expectations functions. Therefore, much of the existing empirical work can be readily used in policy evaluations.

In this section we are interested in the working of the system (the world in relation to terrorism) in response to anti-terror policy. The bulk of the empirical research relating to terrorism has been focussing on parts of the conditional expectation function $E\left[c \cdot T_{t+1} \middle| \text{policy}_t\right]$. Most of the studies aim to estimate causal effects from some variable X on terrorism. There have been many examples of X. In contrast to wide spread beliefs for example, evidence suggests that terrorist engagement is associated neither with poor education nor economic status (e.g., Krueger and Maleckova (2003), Berrebi (2003)). Different approaches have been offered to explain terrorism and the build up of terrorist groups, and to show factors that can affect the intensity and nature of terrorist activities (see e.g., by Hardin (1995), Wintrobe (2006), Berman and Laitin (2005), Laitin and Shapiro (2007). Studies aiming at explaining the emergence of terrorism may be quite valuable for estimating the conditional expectation $E\left[c \cdot T_{t+1} \middle| \text{policy}_t\right]$. Studying all these concepts in isolation gives insight in the working of single pieces of a larger puzzle. A greater set of pieces could eventually provide a more complete picture of the issue at hand.

However, from the results of studies done so far we are not able to be conclusive about the conditional expectation function that we are after. Schematically, we could present the effects of policy investments on T_{t+1} as follows:

$$\begin{aligned} \text{policy} &\rightarrow_1 X \rightarrow_2 T_{t+1} \\ \text{policy} &\longrightarrow_3 T_{t+1} \end{aligned} \tag{3}$$

where the top relationship represents the indirect (causal) effects of policy on terrorism. Investments in education might decrease dissatisfaction and as such decrease the risk of terrorism (this is just an example and not necessarily representing reality). The bottom relationship represent the direct relationship between policy action and the threat of terror. Reinforcing intelligence agencies might deter terrorists and so decrease the threat of terrorism to society. Most of the studies cited above are associated with arrow 2, i.e., the effects of some concept X on terrorism. Yet, for effective policy decision making we need information on all arrows in (3).

Let's see how this would work in a regression framework. We assume for expositional reasons

that conditional expectation functions are linear and additive in their arguments.[2] Let's say that we can discriminate policy that is intended to affect terrorism directly (P^a, where the a stands for anti-terror) and policy that has only a potential indirect effect on terrorism through X. This type of policy we call P^X. Therefore policy = $\{P^a, P^X\}$.

Again, we are interested in the estimating the expectation of T_{t+1} conditional on total government policy:

$$E_t\left[T_{t+1}\middle|\text{policy}_t\right] = E_t\left[T_{t+1}\middle|P_t^a, P_t^X\right] \tag{4}$$

Because P^X is constructed to have only an effect on T_{t+1} through X_t the following relationship should hold:

$$E_t\left[T_{t+1}\middle|X_t, P_t^a, P_t^X\right] = E_t\left[T_{t+1}\middle|X_t, P_t^a\right] \tag{5}$$

Using the law of iterated expectations and the above two relations we may write:

$$\begin{aligned} E_t\left[T_{t+1}\middle|P_t^a, P_t^X\right] &= E_t\left[E_t\left[T_{t+1}\middle|X_t, P_t^a, P_t^X\right]\middle|P_t^a, P_t^X\right] &(6)\\ &= E_t\left[E_t\left[T_{t+1}\middle|X_t, P_t^a\right]\middle|P_t^a, P_t^X\right] &(7)\end{aligned}$$

If we assume that conditional expectation functions are linear and additive in their arguments we can rewrite equation (7):[3]

$$\begin{aligned} E_t\left[T_{t+1}\middle|P_t^a, P_t^X\right] &= E_t\left[E_t\left[T_{t+1}\middle|X_t, P_t^a\right]\middle|P_t^a, P_t^X\right] &(8)\\ &= E_t\left[\gamma_1 X_t + \gamma_2 P_t^a\middle|P_t^a, P_t^X\right] &(9)\\ &= \gamma_1 E_t\left[X_t\middle|P_t^a, P_t^X\right] + \gamma_2 P_t^a &(10)\\ &= \gamma_1\gamma_3 P_t^X + \gamma_2 P_t^a &(11)\end{aligned}$$

Because recent empirical studies on the causes of terrorism tend to focus of the effects of some X on terrorism we merely have estimates for γ_1 (a parameter that measures the causal impact of X_t on T_{t+1}). The parameters γ_2 and γ_3 that form an essential part of the conditional expectation function that we are after, cannot be retrieved from these particular studies. Perhaps we may use empirical studies from different fields to obtain estimates of γ_3 (a parameter that estimates the impact of policy investments on X_t). However, without sufficient data access to policy investments that are intended to target terrorism directly, there is (perhaps) hardly any hope of

[2]This would constitute to a first order approximation of the true conditional expectation functions. The linearity and additivity assumption is widespread in applied statistical work.

[3]To go from equation (10) to equation (11) we impose that P_t^a has no effect on X_t after conditioning on P_t^X

retrieving convincing estimates for γ_2. It may sound obvious, that without data on anti-terror policies empirical researchers have hard time measuring its effectiveness. From a more positive perspective however, it seems quite well possible to obtain estimates of γ_1 and γ_3 from the data sources we have currently available to subsequently construct at least part of the conditional expectation function $E_t\left[T_{t+1}\middle|\text{policy}_t\right]$.

4 Conclusion

Using the example of the threat of terrorism as one type of human-induced insecurities this note defines and analyzes the most important issues concerning decisionmaking about those kind of insecurities from the perspective of a policymaker. The policymaker's objective is to minimize the total costs of a security threat.

We defined the threat of terrorism to consist of three components: 1. direct replacement costs of a terrorist's attack, 2. direct intangible or partly tangible effects of terrorism (this constitutes to losses of lives, social tension and fear), 3. indirect, second order effects, like negative shocks to GDP or trade. With defining these three groups we have tried to be exhaustive. The total costs of terrorism are the sum of the monetary equivalent of the threats defined and the monetary costs of investing in anti-terror policy.

We argue that economists possibilities of helping policymakers making efficient policy decisions is twofold. First, economists can use their techniques to estimate and attach monetary amounts to the three types of threats we have defined. Second, economists can use their techniques to analyze the system causing human-induced insecurities in general and terrorism in particular.

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