Supervisory Committee

Asymmetric Warfare in an Asymmetric World: A Theoretical Analysis of Canadian Antiterrorism Policy and Spending

by

Kyle Burak
B.A., University of Manitoba, 2012

Supervisory Committee

Dr. Nilanjana Roy, (Department of Economics)
Co-Supervisor

Dr. David Scoones, (Department of Economics)
Co-Supervisor
Abstract

Supervisory Committee
Dr. Nilanjana Roy, (Department of Economics)
Co-Supervisor
Dr. David Scoones, (Department of Economics)
Co-Supervisor

An assessment of the costs and benefits of antiterrorism policies has a number of challenges. Canada’s situation is particularly complex because of its asymmetric and integrative economic and geographic relationship with the United States. Few theoretical models of international antiterrorism policy exist and none fit well this asymmetric relationship. This thesis attempts to fill this void by understanding the motives behind Canadian antiterrorism policies and the related spending, and how these are affected by the relationship with the United States. We explore a two country theoretical model with strategic interactions, focusing on relative spending. What is found is that the economics and geography of the two countries play a large role in motivating spending and can drastically alter antiterrorism spending beyond that needed solely for public safety in Canada.
# Table of Contents

Supervisory Committee ................................................................. ii  
Abstract .......................................................................................... iii 
Table of Contents ........................................................................... iv 
List of Tables .................................................................................... vi 
List of Figures ................................................................................... vii 
Acknowledgments ............................................................................. viii 
Dedication .......................................................................................... ix 

Chapter 1: Introduction ...................................................................... 1 

Chapter 2: Defining and Measuring Terrorism .................................. 7 
2.1 Defining Terrorism ..................................................................... 7 
  2.1.1 Excluding State Terrorism from the Definition ...................... 9 
  2.1.2 Including only Civilians and Noncombatants in the Definition ........................................... 11 
  2.1.3 Including Acts of Nonviolence in the Definition ................. 12 
  2.1.4 Definition requires Political, Religious or Social Motivation .............................................. 13 
  2.1.5 Definition requires a Larger Audience Outside of the Immediate Victims ......................... 14 
  2.1.6 Domestic vs. Transnational Terrorism vs. International Terrorism ........................................ 15 
2.2 Comparing different Terrorism Databases ................................... 16 
2.3 Measuring (the cost of) Terrorism .............................................. 23 

Chapter 3: Terrorism and Counterterrorism in Canada .................. 28 
3.1 Creating a Canadian Terrorism Database .................................. 29 
3.2 Terrorism Events in Canada ...................................................... 33 
  3.2.1 Pre-9/11 Terrorism Events in Canada .................................. 33 
  3.2.2 Post-9/11 Terrorism Events in Canada ................................ 38 
3.4 Antiterrorism policy in Canada ................................................ 43 
  3.4.1 Pre-9/11 Antiterrorism Measures ...................................... 43 
  3.4.2 Post-9/11 Antiterrorism Measures ...................................... 46 
  3.4.3 Post-9/11 Antiterrorism Spending ....................................... 50 
3.5 Canadian Terrorism Event List (1970-2013) ............................ 57 

Chapter 4: A Model of Canada-United States Deterrence Decisions ...... 71 
4.1 Literature Review of Theoretical Antiterrorism Models ............... 77 
  4.1.1 Deterrence Approach .......................................................... 78 
  4.1.2 Pre-emption Approach ........................................................ 79 
  4.1.3 Combining Deterrence and Pre-emption ............................ 80 
4.2 Symmetric Model Fundamentals and Key Equilibrium Concepts .... 81 
  4.2.1 Globalized Nash Equilibrium .............................................. 84 
  4.2.2 Autarky Nash Equilibrium .................................................. 86 
  4.2.3 Pareto Efficient Allocation .................................................. 87 
  4.2.5 Choosing Functional Forms ................................................. 89 
4.3 Symmetric Deflection Model Simulation ................................... 90 
4.4 Introducing Asymmetry into the Cost Parameters ..................... 95 
  4.4.1 Estimating the Cost of Terrorism ....................................... 96 
  4.4.2 Parameter Asymmetry Simulation ............................ 98
4.5 Terrorist Bias ............................................................................................................ 102
4.5.1 Quantifying Terrorist Bias .................................................................................. 103
4.5.2 Terrorist Bias Simulation ..................................................................................... 104
4.6 Canadian Deterrence acting as Pre-emption .......................................................... 108
4.6.1 Altering Sandler and Siqueira’s (2006) Deterrence Model Fundamentals and Assumptions for Canadian Deterrence acting as Pre-emption .................................. 108
4.6.1 Simulating Canadian Deterrence acting as Pre-emption in Symmetry .......... 113
4.7 Combined Model .................................................................................................... 118
4.7.1 Quantifying the Obstacle Parameters ................................................................ 119
4.7.2 Combined Model Simulation .............................................................................. 119
Chapter 5: Conclusion ................................................................................................. 124
5.1 Theoretical Model Relative Spending vs. Real World Relative Spending .......... 126
5.2 Preliminary Evidence of Autarky Lowering Antiterrorism Spending ............... 128
5.3 Conclusion and Future Research Areas ................................................................. 130
Bibliography .................................................................................................................. 132
Appendix A: Derivate Proofs ....................................................................................... 140
A.1: Symmetric Deflection Probability Function ...................................................... 140
A.2: Symmetric Probability Function with Canadian Deterrence having characteristics of Pre-emption for the United States ......................................................... 140
A.3: Symmetric Probability Function with Canadian Deterrence having characteristics of Pre-emption for Canada .................................................................................. 141
Appendix B: Terrorist Bias Calculation ....................................................................... 142
Appendix C: Sensitivity Analysis Results ................................................................... 143
C.1 Parameter Asymmetry Sensitivity Analysis ......................................................... 143
C.2 Sensitivity Analysis of Terrorist Preference ......................................................... 144
C.3 Obstacle Parameter Sensitivity Analysis when Canadian Deterrence acts as Pre-emption .................................................................................................................. 145
C.4 Combined Model Sensitivity Analysis ................................................................. 146
Appendix D: Maple 16 Code: Combined Model ......................................................... 148
List of Tables

Table 1: Terrorism Databases by Criteria ................................................................. 19
Table 2: Canadian Terrorism Event Count (annual, 1970-9/11) ............................ 34
Table 3: 1970 FLQ Terrorist Events ......................................................................... 35
Table 4: Post-9/11 Canadian Terrorism Events, annual (9/11-2013) ...................... 38
Table 5: Significant Foiled Terrorist Attacks Post-9/11 ........................................ 40
Table 6: Examples of Antiterrorism Measures Introduced Post-9/11 ...................... 48
Table 7: Canadian Terrorism Event List (1970-2013) ........................................... 58
Table 8: Canadian Model Probability of Terrorist Failure and Spending Values – 92
Symmetry ............................................................................................................... 92
Table 9: United States Model Probability of Terrorist Failure and Spending Values – Symmetry ................................................................. 93
Table 10: Canadian Model Values – Parameter Asymmetry ..................................... 99
Table 11: United States Model Values – Parameter Asymmetry ............................. 99
Table 12: Canadian Model Probability of Terrorist Failure and Spending Values – 105
Terrorist Bias ................................................................................................. 105
Table 13: United States Model Probability of Terrorist Failure and Spending Values - 105
Terrorist Bias ................................................................................................. 105
Table 14: Canadian Model Probability of Terrorist Failure and Spending Values - 115
Canadian Deterrence as Pre-emption ...................................................................... 115
Table 15: United States Model Probability of Terrorist Failure and Spending Values - 115
Canadian Deterrence as Pre-emption ...................................................................... 115
Table 16: Canadian Combined Model Probability of Terrorist Failure and Spending 120
Values ............................................................................................................... 120
Table 17: United States Combined Model Probability of Terrorist Failure and Spending 121
Values ............................................................................................................... 121
Table 18: Canadian-United States Department Spending Comparison (2013-2014 % of 127
GDP) ..................................................................................................................... 127
Table 19: Parameter Sensitivity Analysis (H) .......................................................... 143
Table 20: Parameter Sensitivity Analysis (F) .......................................................... 143
Table 21: Parameter Sensitivity Analysis (f) ............................................................ 144
Table 22: Obstacle Parameter Sensitivity Analysis .................................................. 145
Table 23: Effect of Terrorist Preference on Canadian Deterrence Levels .......... 146
List of Figures

Figure 1: Terrorist incident Count by Database, annual (1968-2009) ........................................ 21
Figure 2: RDWTI vs. ITERATE, annual (1969-1997) ................................................................. 22
Figure 3: Canadian Terrorist Events by International Database, annual (1968-2009) .... 30
Figure 4: Canadian Events as a Percentage of Worldwide Total, annual (1968-2009) .... 30
Figure 5: Canadian Events with zero fatalities as a Percentage of all Canadian Events, annual (1968-2009) ................................................................. 31
Figure 6: Canadian Terrorism Events Count, annual (1970-9/11) ............................................ 37
Figure 7: Post-9/11 Canadian Terrorism Events ............................................................ 41
Figure 8: Average Attacks per year in Canada - per decade (1970-2013) ...................... 42
Figure 9: Percentage Increase in Canadian Antiterrorism Spending (fiscal year, 2000-2013) ........................................................................................................ 52
Figure 10: Correctional Services spending (fiscal year, 2000-2013) ................................ 53
Figure 11: FIAT spending (fiscal year, 2000-2013) ............................................................. 53
Figure 12: Public Safety and Emergency Preparedness spending (fiscal year, 2000-2013) ................................................................................................................ 53
Figure 13: National Defense spending (fiscal year, 2000-2013) ........................................ 53
Figure 14: CSIS spending (fiscal year, 2000-2013) .............................................................. 54
Figure 15: CBSA spending (fiscal year, 2000-2013) ............................................................ 54
Figure 16: RCMP spending (fiscal year, 2000-2013) ............................................................ 54
Figure 17: CATSA spending (fiscal year, 2000-2013) .......................................................... 54
Figure 18: CSEC Spending - part of National Defense (fiscal year, 2000-2013) ........ 55
Figure 19: Canada - United States Symmetric Model (shown as the probability of terrorist failure) ............................................................................................................. 92
Figure 20: Cost Parameter Asymmetry Graph ................................................................. 99
Figure 21: Terrorist Bias Parameter Graph (shown as the probability of terrorist failure) ............................................................................................................. 105
Figure 22: Canadian Deterrence acting as Pre-emption (symmetric case, shown as the probability of terrorist failure) ................................................................. 115
Figure 23: Combined Model Graph (shown as the probability of terrorist failure) ...... 120
Figure 24: Potential GDP loss from a Rejection of American Pleas for Increased Canadian Deterrence ......................................................................................... 125
Acknowledgments

I would like to express my deep gratitude to Dr. Nilanjana Roy and Dr. David Scoones, my thesis supervisors, for their patient guidance, enthusiastic encouragement and useful critiques of this research work. I would also like to thank Mr. Chip Ellis for his guidance on putting together a Canadian terrorism event database, and Mr. Christopher Greer for his help in understanding the programming language for Maple 16.

Finally, I wish to thank my family and friends for their support and encouragement throughout my studies.
Dedication

To my Family.
Chapter 1: Introduction

The primary goal of this thesis is to understand the motives behind Canadian antiterrorism policies and the related spending, and how these are affected by the relationship with Canada’s immediate neighbour, the United States. This is done through exploring a two country theoretical model with strategic interactions.

This is a useful exercise as Canadian antiterrorism policies and spending have come under fire in recent years, but the theoretical basis for these critiques have been unclear. Some have argued that far too much is being spent on antiterrorism and the money would be better spent on other public programs with arguably higher societal benefits (e.g. MacDonald, 2011; Think by Numbers, 2011; Wilson and Thomson, 2005; among others). MacDonald (2011), for example, calculates the increase in public safety related departments since the 2000/01 fiscal year. He then argues that the state of the economy poses a greater threat to the welfare of Canadians than terrorism, and that the antiterrorism money would have greater economic benefits for Canadians if it were spent on public transit, eliminating prescription drug payments, or used on childcare programs (i.e. programs that lower the economic and financial burden on Canadians). One problem with this conclusion is that MacDonald (2011) ignores possible economic reasons (e.g. Canada-American bilateral trade reasons) for increasing antiterrorism spending.

When making claims that this is unneeded spending we need to take into account all possible motives and what the economic effect (and hence welfare implications) of not increasing spending would be. While it may or may not be true that money might better be spent on other programs, the aim of this thesis is to clarify these policy debates by formalizing some elements that people tend to ignore in these discussions; in particular, the role of Canada’s economic (e.g. trade),
security, and geographic relationship with the United States. As Kitchen and Sasikumar (2009) point out, the economic, political, and social links between the two countries can shape Canadian spending. They mention that “Canada had to react both to the terrorist attacks and to the US reaction to the attacks” (p. 158). This angle is often overlooked and is a key factor in understanding Canadian spending, thus it is extensively explored in the theoretical work in Chapter 4. This logically precedes a numerical cost-benefit or cost-effectiveness analysis of current spending habits. However, such an analysis is beyond the scope of this thesis and left for future research.

A review of the literature on the Economics of Terrorism also reveals that the definition of terrorism is not universal. Because the definition is important, we discuss the different definitions of terrorism that are found in the literature. The definition also plays a significant role in how terrorism is measured, which is also examined in Chapter 2.¹

To provide context for the issue, we also examine Canada’s past and present antiterrorism spending and policies, and the terrorism incidents that have taken place. This is completed in Chapter 3. First a list of all terrorism incidents in Canada from 1970 to 2013 is assembled, followed by a look at policies over the same period. We pay particular attention to spending after 9/11. It would be ideal to perform an empirical structural break analysis of terrorist threats, policy and spending for 9/11 to determine whether there was a statistically significant change, but this is infeasible due to various data issues such as the lack of transparency of the government spending for antiterrorism, and also because it is unclear whether new policies prevent terrorism or force terrorists to substitute to other methods.

¹ Given that our theoretical model is based on Sandler and Siqueira (2006), we adopt their definition of terrorism for this thesis.
Chapter 4 begins by reviewing various theoretical models of antiterrorism policies. Particular attention is paid to the model developed by Sandler and Siqueira (2006). In an attempt to explain the collective action problems in fighting terrorism, Sandler and Siqueira (2006) model two distinct antiterrorism policies, deterrence and pre-emption, between two symmetric countries. Their model examines how international cooperation and strategic interactions transform antiterrorism policy and spending. Both deterrence and pre-emption are popular policies around the globe, but Canada has focused on the former. A good way to interpret the distinct characteristics of the two policies and their role for the Canada-United States relationship is through an analogy where Canada and the United States are neighbours who face an identical threat of robberies. Deterrence would be represented as increasing alarms, or putting a fence up around your house. It is a selfish policy that only benefits those introducing it, and holds no benefits to others. It actually deflects robberies (or terrorism) to less secure houses (or countries). Pre-emption is an altruistic policy that benefits the entire neighbourhood by eliminating the very presence of burglars (e.g. hunting them down and arresting them before they cause harm).

With Canada primarily focused on deterrence (e.g. using intelligence and security to prevent terrorism), it is the policy of choice for our theoretical model. However, we argue that the characteristics of Canadian security programs in the relationship with the United States act more as pre-emption, and hence, we also explore this case in our analysis. The geography and economic integration of the two countries allows Canadian security programs to not only provide safety for people and businesses in Canada, but also for those in the United States (including Canadians living or conducting business in the United States). This is done by preventing terrorists from coordinating attacks within Canada and crossing the border to perform them within the United States. This better explains why the United States has pleaded, and to an extent pressured, for
increased Canadian security, which does not fit the traditional characteristics of deterrence seen by Sandler and Siqueira (2006). If Canadian deterrence deflected attacks like the traditional model of deterrence, the United States would have attacks deflected their way when Canadian security increases. The United States should want Canada to lower its spending, not increase it in the traditional deterrence model.

We can clarify how the geographic and economic integration relationship between the two countries causes Canadian deterrence to act as pre-emption through a similar analogy to that of the traditional models. To represent the geographic relationship, we can assume that the two countries live in the same house with the United States being the owner of the basement, and Canada occupying the main level (representing the realistic geography of the continent). For the economic integration, we can assume that the two are close friends and have valuables on each other’s respective floors (representing the shared economic interests and massive trade volume between the two countries).

In this situation, the role of main floor security becomes important for protecting the valuables from burglaries on the main floor as well as in the basement, making main floor (Canadian) security act as pre-emption. For example, putting an alarm security sticker on the front door will deter robberies from occurring on both floors. With Canada having valuables in the basement, it is in their best interest to use this power to protect those valuables, which could be done through installing security at the stairs. Both of these security programs would also protect the American valuables. Basement security, on the other hand, does nothing for protecting the main floor as the only access to the basement is through the stairs from the main floor.\(^2\)

---

\(^2\) The analogy breaks down a bit at this point as transnational terrorism in the United States does not only occur through Canada, but it provides a better understanding of relationship than any other previous model.
So Canadian main floor security has characteristics of pre-emption (protecting both floors), while American basement security is deflecting (protecting only the basement at the expense of the main floor) and having the traditional characteristics of deterrence.

The Sandler and Siqueira (2006) model is completely symmetric, and this is problematic for the Canada-United States case. In particular, Sandler and Siqueira (2006) assume both countries are equal in their willingness and ability to deter, which is most likely not the case for Canada and the United States, where the relationship and economic size is dominated by the United States. For this reason, we introduce a series of modifications to the original model. These include introducing plausible costs of terrorism for both countries (which are most likely asymmetric given the relative size of the economies and population density) and the possibility of terrorism being primarily an American issue. These two modifications, along with the introduction of Canadian deterrence acting as pre-emption, are introduced individually to fully understand how each modification effects spending. This is followed by a combined model with multiple modifications implemented.

The debate related to Canadian antiterrorism policies and the associated spending indicates that that some people believe that cooperation with the United States is costly for Canada in an economic, financial, or political freedom sense, and that Canada should hold an independent stance on security and terrorism. We do not examine whether there are political freedom implications, but our theoretical model can shed light on this debate of whether cooperation is economically costly or beneficial for Canada by comparing the relative spending outcomes of different cooperative and economic integrative relationships.

Without a doubt, the number one reason for stopping terrorism is to prevent fatalities, but this thesis shows that the current debate on Canadian antiterrorism policy and spending is missing a key understanding of how and why certain policies are chosen. There appears to a certain
contradiction in the current debate on Canadian spending, where Canada’s relationship with the United States is held responsible for there being a drastic increase in spending following 9/11 (Kitchen and Sasikumar, 2009). But when the discussion turns to money (e.g. 2013 Auditor General Report on the allocation of $12.9 billion for antiterrorism efforts; MacDonald, 2011) it ignores this and focuses on a simple spending vs. threat debate (i.e. does the spending justify the threat in Canada), and asks why Canada is spending so much on terrorism instead of other public programs. But the relationship with the United States and its effect on Canadian spending cannot be ignored when discussing overspending, or a misallocation of spending. We need to consider what the Canadian economy would look like if it became more independent on the fight against terrorism, turning a blind eye to American pleas for higher spending and cooperation. MacDonald (2011) argues that economic security is more important than terrorism security in Canada given the current state of affairs, but what if the two are intertwined to the point where our economic relationship with the United States is contingent on increased and cooperative security relations? This type of question is important to ask before criticizing Canadian spending, and while our focus is on understanding what the motivations behind the spending are as opposed to the consequences of ignoring them, we provide some discussion in Chapter 5 on the economic impact of failing to take into account security standards set by the United States for Canada.
Chapter 2: Defining and Measuring Terrorism

Two of the biggest issues surrounding terrorism research are finding a universally accepted definition of terrorism and accurately measuring the cost of terrorism. The definition of terrorism is important in determining the outcome of research, as different definitions can cause researchers to come to different conclusions on the amount of terrorism events in a given year. For example, where one person may consider religious vandalism as a form of terrorism, someone else may not. In terms of measuring the cost of a terrorist attack, there are difficulties in measuring the indirect costs, including the effect on consumer behaviour and the psychological effects. A major goal for terrorists, in most definitions, is to create fear in its targeted audience, which is extremely difficult to measure. Also important is measuring the cost potential future attacks in order to implement proper policies to prevent attacks. Determining this is difficult as there are a number of variables that need to be taken into account, including the type of attack, location, terrain, time, and even wind direction.

Given these issues, we discuss different components of defining terrorism, followed by a discussion on domestic vs. transnational terrorism, and investigate the different international databases given their definitions. Concluding the chapter, we go over the issues surrounding measuring the cost terrorism, both empirically and theoretically. This will lead us into our discussion on Canadian terrorism data in Chapter 3.

2.1 Defining Terrorism

While terrorism has directly or indirectly affected the lives of almost every Canadian over the past decade through either terrorist events or the security measures put in place after the 9/11 terrorist attacks, its definition is still up for debate among politicians and academics. Many have attempted
to give terrorism a universally accepted definition, but often the definition is too broad (Roach, 2008). Others have argued that any definition of terrorism is solely a term of convenience as “one man’s terrorist is another man’s freedom fighter”, arguing that if terrorists succeed they are no longer terrorists but liberators and that liberators can one day be terrorists (Higgins, 1997; Laqueur, 1987). Some have gone as far to say that the word should be abolished, citing that there will never be a universally accepted definition since the debate has yet to gain ground (Asal et al., 2012). A universal definition is needed due to different definitions affecting the outcome of economic, statistical, and political research. A universal definition is also needed on an international level for there to be an international agreement on combating and eliminating violent terrorism (Ganor, 2002), and in order to distinguish terrorism from other crimes (Saul, 2008). While in economics researchers have begun accepting the definition of Sandler and Enders (1993) or similar forms of it primarily because of its high similarity to the definition of terrorism behind the top terrorism databases, even Sandler and Enders fall to inconsistencies in their definitions, sometimes including religion as motive and sometimes not (see Sandler (2013), Sandler and Enders (2002) for the inclusion of religion, and Sandler (2009), Sandler and Siqueira (2009) as examples of excluding religion). But outside of economics, while most can agree that at the heart of terrorism is a *group* committing an act of *terror* to bring attention to their *cause* to a targeted *audience*, who the group is, what the act of terror consists of, what their motive behind the attack is and who the audience is are all points of debate in defining terrorism.\(^3\)

In this section different disputed aspects of definitions of terrorism will be examined, comparing different definitions along the way. While in the end no particular definition will be advocated, its

---

\(^3\) Schmidt and Jongman (1988) examined over 100 different definitions of terrorism, finding that violence was required in 83.5% of definitions, political motive in 65%, the creation of fear in 51%, and having an audience beyond the immediate victims in 37.5%. 

8
goal is to provide an overview of the debate in hopes of showing how even a small difference in
definition can affect what is included as terrorism. Afterwards, three international terrorism
databases are compared to show how different definitions influence research outcomes.

2.1.1 Excluding State Terrorism from the Definition

One of the major discussions in the modern debate on terrorism is whether state actors can commit acts of terrorism. In other words can the government of a country be the perpetrator of a terrorist attack, or are they acting in their best interest to protect themselves from (future) international or domestic harm? While in economics state terrorism is generally left out mainly because the international databases used do not include state terrorism, and as Sandler and Enders (2006) also mention, determining the effect of state terrorism on the economy is exceptionally hard to do. Sandler and Enders (2002) do, however, consider state sponsored terrorism (or subnational terrorism), which follows Mickolus et al. (1989). Because the economics literature does not generally include state terrorism, this does not mean that there is no debate on the topic.⁴

Netanyahu (1995, p. 9) describes terrorism as “the deliberate and systematic assault on civilians to inspire fear for political ends”, not explicitly stating who the perpetrators can be.⁵ Here it is unclear whether states can be the perpetrator of terrorism or not. Ruby (2002) explains that it is theoretically possible for a state actor to secretly plan an attack in enemy territory during peacetime to sway public and government opinion on a political or economic issue. But, the question is, is this an act of war, or are they protecting themselves against a current or possible threat?

---

⁴ Economists undertaking empirical research on terrorism are somewhat forced to not include state terrorism as it is not included in the databases. Thus it may not reflect the researcher’s actual thoughts and beliefs on whether state terrorism is considered terrorism.

⁵ “Civilian” was added in the 3rd edition to replace “innocent” (Ganor, 2002).
Two academics that argue that state terrorism does exist and has happened are Chomsky and Herman. Both have argued that the United States has been the perpetrator of state terrorism in their book *The Political Economy of Human Rights* (1979). Chomsky has also written about state terrorism and his displeasure with United States’ foreign policy since 1981, arguing that many of the United States’ foreign confrontations fall under state terrorism. Chomsky (2007) argues that the 1984 conflict between the United States and Nicaragua was blatant state terrorism by the United States. Blakeley (2009) also argues that there have been numerous instances of state terrorism in the past, drawing examples from Europe and the United States during colonization, and the United States during the Cold War and War on Terror.

Laqueur (2003) argues that states have a monopoly of power and have earned the right to act in their best interest domestically and internationally with force (if needed) to have a peaceful state. While in some scenarios this may be true, there exists international laws (e.g. Geneva Convention) in place to prohibit the inhumane and unlawful use of state violence, especially against civilians (Hoffman, 1998; Protocol I Additional to the Geneva Convention, 1977). According to the United Nations, these attacks are not acts of terrorism. State coordinated attacks on civilians during wartime are war crimes and attacks against civilians during peacetime are crimes against humanity (Ganor, 2002).

The possible inclusion of state terrorism is possibly the most debated aspect of terrorism. While the United States is often accused of state terrorism, it has never been formally accused of conducting it, and this most likely because those with the power to do so define what is and what is not terrorism, and the United States has been in this situation for some time.
2.1.2 Including only Civilians and Noncombatants in the Definition

Many definitions focus on terrorism solely occurring to civilians and noncombatants, implying that terrorist attacks on enemy combatants cannot be considered terrorism, but acts of war. The event at the heart of this debate is whether the bombing of the USS Cole was a terrorist attack or not. While the attack was carried out by the terrorist organization Al Qaeda, some do not consider it a terrorist attack as it was an attack against military personnel aboard the naval ship. Along with Sandler and Enders (2002), the government of the United States considers an attack terrorism if it is an attack against noncombatants and/or civilians stating terrorism is “politically motivated violence perpetrated in a clandestine manner against noncombatants” (Ruby, 2002, p. 9). Although it states that noncombatants are the target of the violence, the definition of noncombatants can itself be interpreted differently. Ruby (2002) explains that in some instances, and in the case of the United States’ government’s definition of terrorism, military personnel during peacetime fall under noncombatants along with the general civilian population (2002).

An example of not explicitly stating whether it must be against noncombatants and/or civilians is Jean-Marc Sorel’s (2003, p. 370) definition, which states that terrorism is

“[…] an illicit act which creates a disturbance in the public order as defined by the international community, by using indiscriminate violence in order to generate an atmosphere of terror with the aim of influencing political action”.

There is no mention in the definition of whom the attack must be against. It is left ambiguous whether attacks against military personnel are considered terrorism or not. Current Prime Minister of Israel Netanyahu, who has studied terrorism extensively outside of politics, does not include the term noncombatants either, solely using the terms civilians in his 1995 book on terrorism. Attacks
on military personal while representing their country can then be branded as guerilla warfare and not terrorism (Ganor, 2002).

2.1.3 Including Acts of Nonviolence in the Definition

Most academics (economists included) only consider terrorist incidents that include some act of violence (Sandler and Enders, 2002, 2006; Schmidt and Jongman, 1988), eliminating the possibility of attacks that may not include violence to be considered terrorism. Sandler and Enders (2006) argue that terrorism requires violence in order for politicians to make the change terrorists desire. While violent threats and violence itself may be the easiest way to quickly terrorize a targeted audience and force a politician’s hand, there does exist other ways for terrorists to terrorize. This includes cyber terrorism and terrorism directly focused on damaging the economy.

One disadvantage of including non-violent terrorism acts are that it becomes more difficult to calculate the magnitude of the attack. While violent attacks can be compared in terms of casualties, injuries, or capital loss, attacks that do not include violence would not have any of these, making it almost impossible to compare a nonviolent attack to a violent attack. This makes it hard to include them in a terrorism database.

In terms of the philosophical meaning of terrorism, Primoratz (1990) looks into the relationship between terrorism and violence. He finds that while there is rarely a debate on the topic, Wellman (1979) argues that while violence is possibly the easiest way to produce terror, it is not needed. Wellman (1979) includes an example in his paper where he conducts acts of nonviolent terrorism by threatening to fail his students who hand in their assignments late. Primoratz (1990) argues against Wellman, saying that this is indeed violence as it inflicts a form of psychological harm on the students, making all terrorist attacks are violent in nature. The argument over the inclusion of only violence then comes down to what your definition of violence is and whether it includes
nonphysical and economic harm or not. While this is not the best example of terrorism as it fails to meet the criteria of a political, economic, or religious motive, and there is no audience other than the students affected, it provides a valuable argument on whether violence is a required condition.

2.1.4 Definition requires Political, Religious or Social Motivation

While today a terrorism definition without the requirement that it be either politically, religiously or socially motivated is rare, before-9/11 many national definitions did not have this requirement and some still do not consider religious motive as necessarily terrorism. Some academics that include religion as a motive include Sandler and Enders (2002) and Sandler (2013). In terms of political, religious or social motive, the governments of Britain and Canada did not include them as requirements to be considered terrorism until after 9/11 (Roach, 2008). Not until recently has the majority of United States departments changed their view on different motives, but even still the United States Department of Defense still only states that it is often motivated by politics (U.S. Department of Defense, 2010). Specifically for religion, the Federal Bureau of Investigation (FBI) does not include religious motive (U.S. Department of Justice, n.d.) as necessarily terrorism and this is also true for a number of other definitions (Sandler and Enders, 1993, 2002; Sandler, 2013; Llussa and Tavaras, 2007, 2011; Muller, 2011), but this does not stop the general public from associating religion with terrorism.

Pape (2005) and Hassan (2008) oppose including religious motive, stating that most terrorist attacks being associated as having a religious motive are in fact politically motivated. Pape (2005) examined 315 suicide bombings (almost all characterized as having religious motives) from 1980 to 2003 and found that there is rarely actual religious motive behind the bombings, rather he finds that the organizations behind the attacks are motivated to remove the political, military and
economic motives of democratic nations intervening in foreign relations for their own benefit. Pape (2005) concludes that religion should not be included as the motive behind terrorism, specifically suicide terrorism.

Some have argued that the political motive requirement violates the human right of free speech (Section 2 of the Canadian Charter). In Canada’s *R v Khawaja* trial, Judge J. Rutherford concluded that this requirement of terrorism is “an unjustified violation of freedom of expression, religion, and association”, will “chill […] democratic life; and will promote fear and suspicion of targeted political or religious groups […]” (Roach, 2008, p. 104). It can be argued that the political and/or religious motive requirement has increased the profiling of certain ethnicities, religions, and political ideologists. But without the inclusion of some sort of motive in the definition it becomes even vaguer, bringing into question whether acts of violence like school shootings are terrorism. While it may make sense to eliminate the requirement in an international criminal law standpoint when terrorists are being prosecuted in court, in terms of researching and analyzing terrorism the motive requirement allows researchers to examine how to respond to terrorism (Roach, 2008).

**2.1.5 Definition requires a Larger Audience Outside of the Immediate Victims**

The last part of the definition to be discussed is whether there needs to be a larger audience outside of the immediate victims of a terrorist attack. Terrorists want to send a message to those who have the ability to act on the change they desire, and the easiest way to get their message across is through fear and terror throughout a large targeted audience in hopes of creating pressure on politicians (Sandler and Enders, 2002). For example, the 9/11 attacks were not a message to those onboard the four flights or those in the World Trade Centre but a message to the American government to eliminate their presence in the Middle East (Ruby, 2002). While it may not be the most controversial part of defining terrorism today, it is still an important part.
Most definitions of terrorism include that there is a larger audience (Kaplan, 1981; Oots, 1990; Jones and Fong, 1994; Sandler, 2009, 2010; Sorel, 2003) and while there can be arguments that assassinations are terrorism to a direct audience, assassinations of public figures are likely also aimed for the general public, as the terrorists want attention to their disagreement with the current economic or political system.

2.1.6 Domestic vs. Transnational Terrorism vs. International Terrorism

Besides the general definition of terrorism, it is important to understand the difference between domestic and transnational terrorism. An important reason to know the difference between the two is that domestic terrorism largely outnumbers international terrorist incidents, as much as 8 to 1 (Sandler and Enders, 2006, 2008; Young and Fidley, 2011; Sheehan, 2012). While analyzing international terror events is important (see Mickolus, 1980; Sandler and Enders, 1999, 2000, Koch and Cranmer, 2007; Brock and Hess, 2006; Bird and Blomberg, 2008; Sandler, 2003, 2009), when discussing terrorism as a whole, it is important to remember domestic events, as well. The root cause of the two may be different and the retaliation measures by governments may also be different (Young and Fidley, 2011; Sandler, 2009). Whereas after an international attack a country may tighten up border security, the same course of action would not be ideal following a domestic attack.

Domestic terrorism is when there is only one country involved in the attack. The perpetrator, the victims, and audience are all from the same country (Sandler and Enders, 2010). An example of this would be the Oklahoma City bombing of April 19, 1995 that killed 168 civilians. The act was perpetrated by two Americans on United States soil in retaliation for events that also occurred in the United States (“McVeigh offers little remorse in letters”, 2001). If any other country is involved in the event, it is considered an international or transnational terrorist event (Sandler and Enders,
2010). An example of an international terrorist event is the 1985 Air India Flight 182 bombing that killed 329 civilians. Sikh extremists carried out the bombing of the aircraft en route to New Delhi, India from Montreal, Canada over Irish airspace. With multiple countries involved, there is no question it was an international terrorist event.

The difference between transnational and international terrorism is also debated (Lafree et al., 2006). While many consider the two to be indistinguishable, historically the two have different meanings. From earlier research, transnational terrorism is defined as acts of terrorism perpetrated by non-state actors that are attacking a foreign country (Fowler, 1981) or (non-sponsored) sub-state actors (Milbank, 1976). International terrorism refers to terrorism that simply involves more than one nation. The reason the two are often used synonymously is because international events can be transnational. An attack that involves more than one country often includes transnational terrorists, as most international terrorism is conducted by non-state actors. An example of the two being used synonymously is in the International Terrorism: Attributes of Terrorist Events (ITERATE) database (Lafree et al., 2006), which is examined in the next section.

### 2.2 Comparing Different Terrorism Databases

There are three major terrorism databases: ITERATE, the Global Terrorism Database (GTD) and the RAND Database of Worldwide Terrorism Incidents (RDWTI). All three provide researchers with information related to individual terrorist incidents (e.g. number of fatalities, injuries, country attacked, perpetrators). Although all three aim to provide the same information on terrorist events, all three differ in terms of their definition of terrorism and the countries/territories they include. Similarities across all three include that the terrorist attack must include a violent threat or attack,
and none of the databases include state terrorism. This is where the similarities end (Sheehan, 2012).

The RDWTI, which includes international events beginning in 1968 and domestic events beginning in 1998, defines terrorism as:

…violence calculated to create an atmosphere of fear and alarm to coerce others into actions they would not otherwise undertake, or refrain from actions they desired to take. Acts of terrorism are generally directed against civilian targets. The motives of all terrorists are political, and terrorist actions are generally carried out in a way that will achieve maximum publicity. (RDWTI Database Scope, 2011).

They make it clear that if a criminal act is carried out by a terrorist organization, it does not guarantee that it qualifies as a terrorist attacks. An example they provide reiterates this statement:

Though all terrorist acts are criminal, not all crime is terrorism. Accordingly, the RDWTI does not include basic criminal acts, even if they are perpetrated by a terrorist organization: Revolutionary Armed Forces of Colombia (FARC) attacks against civilians are included, but not drug-trafficking activities. (RDWTI Database Scope, 2011).

They also explain “RDWTI only includes attacks against military targets if such an attack makes a broader political statement” (RDWTI Database Scope, 2011). With this, the USS Cole attack on October 12, 2000 qualifies as a terrorist attack as the attack was to send a political message on the involvement of the United States in the Middle East. This is consistent with the views of the United States government (Ruby, 2002). In terms of other definition issues discussed earlier, the RDWTI does not include religious motive in its definition. State terrorism is not included, violence is a
requirement and it is not made explicitly clear whether the attack must be made to grab the attention of a larger audience than those targeted, as the word *generally* is ambiguous.

The GTD, which provides domestic and transnational events beginning in 1970, defines terrorism as the “threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation” (START GTD Data Collection Methodology, 2011). But unlike the other international databases, the GTD allows researchers to select their own criteria, making it unique. When selecting, in order for an event to qualify as a terrorist attack at least two of the three following criteria must hold.

1. The act must be aimed at attaining a political, economic, religious, or social goal.
2. There must be evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) than the immediate victims.
3. The action must be outside the context of legitimate warfare activities, i.e. the act must be outside the parameters permitted by international humanitarian law (particularly the admonition against deliberately targeting civilians or non-combatants).

In terms of the discussed issues, the GTD does include religion as a motive unlike the RDWTI, as well as economic and social motives, and requires some sort of violence. Also, given that only two of the three criteria have to be satisfied for an event to be considered terrorism in the GTD, events included in the GTD as terrorism might not be outside of legitimate warfare and attacks against enemy combatants during peacetime (Sheehan, 2012).

Finally, ITERATE, which includes transnational events as far back as 1968, defines terrorism as:

[…] the use, or threat of use, of anxiety-inducing, extra-normal violence for political purposes by any individual or group, whether acting for or in opposition to established
governmental authority, when such action is intended to influence the attitudes and behavior of a target group wider than the immediate victims. (Mickolus et al., 2013, p. 2).

Comparing ITERATE to the other two databases, ITERATE contains the attack on the USS Cole in Yemen on October 12, 2000 even though they are not considered civilians, similar to the RDWTI and the GTD. ITERATE, as well as the other two databases, requires violence and does not include state terrorism. Similar to the RDWTI, it lists the sole motive as political, but unlike the GTD or the RDWTI, ITERATE makes it clear that the political message the terrorists are sending is towards an audience outside of the immediate victims. We can see the differences in terms of each database’s definition in Table 1.

Table 1: Terrorism Databases by Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>GTD</th>
<th>RDWTI</th>
<th>ITERATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Threat of) Violence required</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Audience outside of immediate victims</td>
<td>Not a requirement under user selected criteria</td>
<td>Not clear</td>
<td>Yes</td>
</tr>
<tr>
<td>State Terrorism</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Motive</td>
<td>Political, economic, religious, or social</td>
<td>Political</td>
<td>Political</td>
</tr>
<tr>
<td>Do attacks against the military in peacetime count?</td>
<td>Yes</td>
<td>&quot;If such an attack makes a broader political statement&quot;</td>
<td>Yes</td>
</tr>
<tr>
<td>Domestic Terrorism</td>
<td>1970-present</td>
<td>1998-present</td>
<td>No</td>
</tr>
<tr>
<td>International Terrorism</td>
<td>1970-present</td>
<td>1968-present</td>
<td>1968-present</td>
</tr>
</tbody>
</table>

In terms of geographical coverage, all three do a good job of distinguishing between shifts in sovereignty over time, however, they all include a different list of what they consider nations
The GTD “includes non-independent states, dependencies and territories, such as North Ireland and Corsica” (GTD Codebook: Inclusion Criteria and Variables, 2012, p. 12) but does not include separatist countries like Kashmir or Palestine. The RDWTI includes Kashmir as a separate territory from India, and ITERATE considers Palestine its own territory. In the case where a separatist territory is not recognized, attacks occurring within these separatist territories will belong to the recognized country (e.g. Russia in the case of Chechnya). ITERATE includes Chechnya and Palestine unlike the GTD, and also includes Northern Ireland and Corsica. RDWTI also includes Chechnya, Corsica, Northern Ireland, but not Palestine. These irregularities can cause certain databases to include an attack as domestic, while some consider it international. As an example, ITERATE, which only includes international terrorism, might be including what the GTD considers domestic terrorism (Mickolus, 2003). If there is an attack that originates in Chechen territory that occurs in another Russian territory, the GTD would consider this a domestic event while ITERATE would consider it an international or transnational event.

To give a graphical representation of the differences between the three databases, Figures 1 and 2 show the number of worldwide terrorist incidents by database. It is important to remember that all three databases differ in terms of countries included and definition. ITERATE only includes international terrorist incidents where at least two countries are involved (Sandler and Enders, 2008) and the RDWTI only includes both domestic and international terrorist events beginning in 1998 (Sheehan, 2012) but does contain large scale domestic terrorist attacks before 1998 (RDWTI includes the Oklahoma city bombing of April 19, 1995). The GTD is the only database that includes both domestic and international events as far back as 1970. The difference in terms of total terrorist events for a given year can be attributed to these differences.
Clearly ITERATE and the RDWTI show less terrorism than the GTD. This shows how frequently domestic terrorism occurs compared to international terrorism, even with differing country criteria for each database. At its highest point in 1992, the GTD includes over 4,700 more observations than both the RDWTI and ITERATE. In 2006, when the RDWTI was reporting domestic terrorism, it reports over 6,500 more observations than ITERATE, providing evidence that domestic terrorism largely outnumbers the amount of international terrorist events not only for the GTD. Overall, the GTD averages 11.6 times more terrorism than ITERATE in any given year.

While differences per year can be caused by definition and the list of countries each database includes, they can also be caused by their determination of whether an outbreak of $n$ attacks conducted by the same terrorist group within a short period of time with the same cause is considered one attack or $n$ attacks. An example of this is 9/11. The RDWTI considers 9/11 as three attacks, including the attack on the twin towers as a single attack. The GTD and ITERATE consider
it four attacks. It is these types of small differences that can result in all three producing vastly different results on the number of terrorist attacks, and one that researchers should take note of before conducting terrorism research.

**Figure 2: RDWTI vs. ITERATE, annual (1969-1997)**

When we only look at international terrorism through 1968 to 1997 with the RDWTI and ITERATE databases, we find that they are closer in terms of numbers and in many years exhibit the same trends. Both databases show large spikes in 1976 and 1991, as well as an overall increase in terrorism from 1968 to the mid to late 1980s, followed by a decline that goes into the 2000s. The fact the RDWTI always includes less terrorism except for 1996 can be attributed to the number of differences already listed.

It should now be clear that there exist many issues with creating a universally accepted definition of terrorism. Whichever definition researchers choose to perform analysis can severely impact results, as detected through the scope of the databases. Researchers should always include what
definition of terrorism they are using and what database they are using as all databases differ in at least some aspects, including the characteristics of terrorism and geography.

2.3 Measuring (the cost of) Terrorism

The definition of terrorism is important in measuring terrorist events, but arguably more important is attempting to measure the actual cost of terrorist events. Knowing the difficulties and past attempts of measuring the cost of terrorism will help us when attempting to measure the cost of future terrorist attacks in Canada. It is not necessarily the amount of terrorist events that matters, but the cost to society that these attacks cause. Large attacks can carry significant costs for a country, and even small recurring attacks can do the same by instilling fear into the public of future attacks. Most studies measure the direct cost of the terrorist attack, not taking into account the indirect costs that include the effect on individual behaviour. These studies look at the human and physical damage lost, not taking into account the terror in terrorism, making the terrorist event cost studies no different than measuring any other form of damage.

When attempting to measure the cost of terrorism the first and most important step is to decide how it will be measured. For economists, the most widely used method is in terms of lost output. Most such studies are primarily focused within the United States, but research on the effect on output has ranged from global studies, to regional studies (e.g. Asia, Middle East), and to country specific studies. Papers on terrorism’s effect on output includes Eckstein and Tsiddon (2004), Gaibulloev and Sandler (2009), Llussa and Tavares (2011), Blomberg, Hess, and Orphanides (2003), Gupta et al. (2004), and Tavares (2004), among others. What is often found is that the effect of a single attack is often absorbed, while countries with recurring attacks have significant negative impacts on output. A country’s stage of development is also important, as developed
countries are able to absorb the impact much more than a developing country. The effect terrorism has on government spending and the spending’s effect on the economy are also important to consider. Work in this area include Blomberg, Hess, and Orphanides (2003), Gupta et al., (2004), and Gaibulloev and Sandler (2009). When governments respond to terrorism with an increase in defense and aid expenditure we can witness governments moving resources away from public expenditure, which can hurt output. This is often a criticism of post-9/11 spending in Canada. There has also been substantial research on the effect of terrorism on different sectors of the economy, including the tourism industry (Drakos and Kutan, 2003; Arana and Leon, 2008; Enders, Sandler and Parise, 1992; and Neumayer, 2004), the airline industry (Ito and Lee, 2005; Drakos, 2004; Blakock, Kadiyali and Simon, 2007), and bilateral trade (Mirza and Thierry, 2008; Nitsch and Schumacher, 2004; Blomberg and Hess, 2006; Lenain, Bonturi, and Koen, 2002).

Gross ex post analyses have been done to estimate the cost of 9/11, and the negative economic impact has been estimated to range from $90 billion (Navarro and Spencer, 2002) to $123 billion by the CREATE Homeland Research Center in 2011 (results recalculated in 2013 CAD). However, these numbers do not include the indirect social costs of an attack, however.

We also need to determine what governments take into account when determining their response, which itself is a cost of terrorism. Do they take into account lost output, or do they consider gross measurements? This is a question that is not only important for empirical work, but theoretical work later done in this paper. It could be that governments take into account the amount of fatalities and injuries, which brings the question of would an attack with no fatalities, but with a large economic loss be taken more seriously than a theoretical attack that kills thousands with a
relatively small economic loss?\textsuperscript{6} Governments may also use gross cost as opposed to percentage of output. Would an attack of equal magnitude see greater relative response from a small country compared to a large country? It may simply be that different countries use different methods. An argument could also be made that there exists diminishing efforts by government. The change in response from an attack causing $210$ billion in damage compared to $200$ billion would be smaller than the change in response from an attack causing $20$ billion compared to $10$ billion.

Moving away from how a government may measure attacks, there are a number of issues that make it particularly difficult to estimate the cost savings from a prevented attack. First, there are multiple different types of attacks that could occur, all with different costs. Hijackings and bombings have become a popular method of terrorism over the past four decades, however with increasing transportation security along with increasing technology and easy access, the threat of chemical, biological, radiological, and nuclear (CBRN) terrorism has become an increasing focal point for governments (Enders and Olsen, 2011; Silver, 2013). Simulation models (e.g. the 2001 American “Dark Winter” simulation) provide policy makers with a hypothetical situation of how a relatively modest small pox attack in three malls can spread quickly, killing approximately 1/3 of the people who become infected (Silver, 2013). Not only does this provide researchers with an approximate number of fatalities, it also tells us how easy and cheap it can be to do so, and how without a proper response plan it can spread uncontrollably, killing millions (Silver, 2013). Other studies include Kaufmann, Meltzer, and Schmid (1997), who calculate the cost of a bioterrorist attack per 100,000 person exposed. They find that the economic cost can vary from $477.7$ million to $26.2$ billion, depending on the type of biological attack. A RAND study similarly determined

\textsuperscript{6} This scenarios is highly unlikely, however, as an attack with many individuals being killed would come with high associated economic costs. For this reason the scenario is only known as theoretical.
the economic loss due to a tactical 5 kiloton bomb being denoted in California would be upwards of $1 trillion with 60,000 instant fatalities (Enders and Olsen, 2011). Unfortunately, to our knowledge no simulation studies have been done for Canada.

While the type of attack is crucial in understanding the cost of an attack, the location, time of attack, wind direction, and temperature can be just as important. In the event of nuclear terrorism, the wind direction and temperature are crucial is measuring the spread of radioactive material. While the location and time of attack can drastically change the amount of fatalities.

What is missing from most studies though, including the ones discussed, is the inclusion of the indirect social costs of (potential) terrorism (e.g. the psychological impact on individuals, a child not growing up with a parent after the parent’s death, etc.). Fear of recurring attacks can curb consumer behaviour, alter the way individuals and business conduct transfers, and increase insurance rates. For example, Blakock, Kadiyali and Simon (2009) found that consumers moving away from airline travel towards road travel after 9/11 caused an increase of up to 2,300 automotive deaths. Another example, while not terrorism (most), school shootings have instilled a fear of recurring attacks in the minds of students, teachers, and parents. A school’s reputation may be compromised, and communities may be perceived as unsafe for children. This is a form of altered behaviour due to fear. An attack that does not have immediate costs might in fact have greater indirect costs, which cannot be ignored, even if they are nearly impossible to quantify.

Measuring terrorism is an extremely difficult thing to do, with many variables coming into play, including the definition which determines whether an attack truly is terrorism or not. These issues should always be considered when conducting terrorism research. We do this when we conduct our analysis of Canadian antiterrorism policy, spending, and terrorism events in the next chapter, by always making sure the events fit a chosen definition. The difficulties of attempting to measure
the impact terrorism are considered when attempting to measure the cost of potential terrorist attacks in Canada (and the United States) in Chapter 4.
Chapter 3: Terrorism and Counterterrorism in Canada

Before undertaking a theoretical analysis, it is useful to examine Canada’s past and present antiterrorism spending and policies, and the terrorism incidents that have taken place in order to provide some context. It is important to provide a historical analysis before beginning to criticize or commend Canada’s stance, as it paves the way for more data backed conclusions. Specifically, this chapter does two things:

1) First, using the definition of Sandler and Siqueira (2006), we compile a list of all terrorism incident in Canada from 1970 to 2013. There currently does not exist an up-to-date list, making this a worthwhile exercise. Arguments on whether the spending outweighs the threat become speculative without having data to back up this claim. For the purpose of this thesis, it can be used to determine if there truly are domestic public safety reasons for the increase in antiterrorism spending after 9/11.

2) Secondly, we look at Canadian antiterrorism policies from 1970 to 2013 and spending after 9/11. We can use this information to examine the magnitude of the increase in policy and spending after 9/11. And by analysing the implementation of different policies, we can find if there was any motives other than public safety for this increase, specifically due to Canada’s multidimensional relationship with the United States.

This historical analysis is not without flaws. It would be ideal to perform an empirical structural break analysis of terrorist threats, policy and spending for 9/11 to determine whether there was a statistically significant change, but this is infeasible due to various data issues, such as the lack of transparency of the government spending for antiterrorism. There are questions of whether Canada needed to increase spending to come of age in an increasingly technological world following
budget cuts in the 1990s, and whether the new policies prevent terrorism or force terrorists to substitute to other methods.

3.1 Creating a Canadian Terrorism Database

Before digging into the data, it is helpful to understand some constraints that are faced when collecting Canadian antiterrorism spending and terrorist incident data. In terms of spending data, the federal government now publishes fiscal year spending for individual departments spending through Public Works Canada. However, it is still impossible to break down the spending within a department. For example, getting National Defense budget data is possible, but breaking down the budget to how much of it was used for antiterrorism is not.

Currently, there does not exist a Canadian specific terrorist incident database. International databases provide an initial list of events, but miss out on a large number of them (this proves clear when counting the Front de Liberation du Quebec incidences), or in some cases get information wrong (e.g. date, fatality/injury count). A lot of this comes down to what definition of terrorism is used. Of the three international databases we analyzed in Chapter 2, none have a complete overlapping of events in Canada in terms of event count, dates, or fatality/injury count. The following graphs highlight this by showing Canadian events over time for the three databases. Figure 3 shows that all three databases differ in their event count for almost every year and that there are years where the difference in the number of events is as high as 5 or 6. In terms of Canadian data this is high.

7 An example of getting information wrong is an arson attack by the Earth Liberation Front in Guelph, Ontario on January 27, 2006. The RDWTI lists the attack as occurring on January 25, 2006. This type of error occurs in at least two more instances in the databases.
Figure 3: Canadian Terrorist Events by International Database, annual (1968-2009)

Figure 4: Canadian Events as a Percentage of Worldwide Total, annual (1968-2009)
In Figure 4 we can see how Canada measures against the international community. Other than the early 1970s, Canada has never had a large percentage of global attacks, most often falling in the 0% to 3% range of total global attacks.

Figure 5 shows how Canadian events with fatalities are rare, although dependent on database chosen.

**Figure 5: Canadian Events with zero fatalities as a Percentage of all Canadian Events, annual (1968-2009)**

With these discrepancies throughout the international databases and the possibility of missing events, it is not ideal to base one’s analysis on one database. Therefore, we use all three databases as a starting point for a creation of a more complete list. Besides the international databases, information is gathered from other sources for missing events, while always using Sandler and Siqueira’s (2006) definition of terrorism:
Terrorism is the premeditated use, or threat of use, of extra-normal violence by individuals or subnational organizations to obtain a political objective through intimidation or fear directed at an audience beyond the immediate victim. (p. 1372, para. 1).

Sandler and Siqueira’s (2006) definition is chosen as it is similar to many definitions of terrorism used in economics. In addition, since our theoretical analysis in Chapter 4 is based on Sandler and Siqueira (2006), for consistency we use their definition for all our analyses in this thesis.

All three databases are thoroughly examined to see whether the events fit the above definition. Events that are missed (or were determined not to be terrorism by other databases) but we feel fall under this definition are included. As well, questionable inclusions are evaluated to determine whether they should be included. For missing events, we primarily gather data from the 1991 Solicitor General Report on terrorism from 1960-1989. Terrorism and extremism reports are also used, along with various online search tools. While we attempt to include a complete list, there is always the possibility that some attacks have been overlooked or that some events have been withheld from the public to prevent the spread of fear. Also, finding details on events that occurred before the widespread use of the internet proves difficult at times.

The complete list of events along with details is available at the end of this chapter. References for each event are also available within the table, and while most events have well-known sources (e.g. International databases, Solicitor General Report, CBC), some event sources may not be as reputable. In some cases less authoritative sources are used to confirm the crucial details of the event (date, perpetrator, reason, etc.) that determine whether an attack is truly terrorism, which are not always reported by larger news sources (e.g. CBC). Section 3.2 goes over this data. The next section contains a discussion based the collected data.
3.2 Terrorism Events in Canada

We first examine the created list of terrorism events in Canada from 1970 until 2013. The list is beneficial for this thesis in knowing whether there are public safety reasons for increasing antiterrorism policy, but it can be even more important in future policy making work.

First we look at terrorism events from 1970 until September 11, 2001, followed by a look at events from 9/11 until the end of 2013. This is done to observe whether there are any obvious changes in the data after 9/11 (e.g. trend towards more deadly terrorism post-9/11). That being said, it is extremely difficult to know whether there exists increased threat. This is partially caused by terrorism getting more headlines after 9/11. Every little mention of a bomb or attack is now seen as a serious threat and arguably gets significantly more media attention than before 9/11.

3.2.1 Pre-9/11 Terrorism Events in Canada

Beginning in the late 1960s political violence and terrorism threatened Canada with the rise of the Front de Liberation du Quebec (FLQ) and the Quebec Separatist movement, and became one of Canada’s most prominent moments in the past century. By examining the overall Canadian event count, we can observe in Table 2 that the level of attacks in 1970 and 1971, driven by the FLQ, is by far the most prevalent over our entire time span.

The FLQ campaign lasted eight years and was responsible for a number of bombings, including the 1969 Montreal Stock Exchange bombing (Charters, 2008). It escalated to the October Crisis in 1970 where both the British Trade Commissioner James Cross and Quebec Minister of Labour Pierre Laporte were kidnapped. Laporte was later murdered while attempting to escape on October 15th. Despite the number of events, relatively little deaths (other than Laporte and a victim of the bombing at a National Defense communications centre in Ottawa) and little damage resulted from
Table 2: Canadian Terrorism Event Count (annual, 1970-9/11)

<table>
<thead>
<tr>
<th>Year</th>
<th>Canadian Event Count</th>
<th>Year</th>
<th>Canadian Event Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>26</td>
<td>1986</td>
<td>11</td>
</tr>
<tr>
<td>1971</td>
<td>22</td>
<td>1987</td>
<td>2</td>
</tr>
<tr>
<td>1972</td>
<td>7</td>
<td>1988</td>
<td>2</td>
</tr>
<tr>
<td>1973</td>
<td>1</td>
<td>1989</td>
<td>4</td>
</tr>
<tr>
<td>1974</td>
<td>3</td>
<td>1990</td>
<td>0</td>
</tr>
<tr>
<td>1975</td>
<td>2</td>
<td>1991</td>
<td>9</td>
</tr>
<tr>
<td>1976</td>
<td>2</td>
<td>1992</td>
<td>9</td>
</tr>
<tr>
<td>1977</td>
<td>5</td>
<td>1993</td>
<td>4</td>
</tr>
<tr>
<td>1978</td>
<td>4</td>
<td>1994</td>
<td>5</td>
</tr>
<tr>
<td>1979</td>
<td>3</td>
<td>1995</td>
<td>9</td>
</tr>
<tr>
<td>1980</td>
<td>11</td>
<td>1996</td>
<td>3</td>
</tr>
<tr>
<td>1981</td>
<td>14</td>
<td>1997</td>
<td>2</td>
</tr>
<tr>
<td>1982</td>
<td>12</td>
<td>1998</td>
<td>4</td>
</tr>
<tr>
<td>1983</td>
<td>6</td>
<td>1999</td>
<td>2</td>
</tr>
<tr>
<td>1984</td>
<td>6</td>
<td>2000</td>
<td>10</td>
</tr>
<tr>
<td>1985</td>
<td>6</td>
<td>2001 (Before-9/11)</td>
<td>1</td>
</tr>
</tbody>
</table>

the almost decade long violence (Charters, 2008). Most attacks by the FLQ were made at locations and/or times where individuals were out of harm’s way. The FLQ events throughout 1970 are highlighted in the following table. While 1971 also included a number of events, it did not nearly have the same number of FLQ events as 1970.

For comparison, the third highest year in terms of attacks, 1981, had 64% fewer attacks than the second highest year 1971. This dwindling of terrorism in the mid to late 1970s was led by the dissipation of the FLQ. While Quebec separatist terrorism has continued in small doses since the FLQ, the mid-1970s saw a change towards a new era of terrorism in Canada.
<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-Feb-70</td>
<td>Conspiracy to kidnap Israel Consul in Montreal</td>
<td>Montreal</td>
</tr>
<tr>
<td>07-May-70</td>
<td>Bombing of postal substation in Montreal</td>
<td>Montreal</td>
</tr>
<tr>
<td>24-May-70</td>
<td>Bomb explosion at the Board of Trade building in Montreal.</td>
<td>Montreal</td>
</tr>
<tr>
<td>28-May-70</td>
<td>Bombing at the head office of General Electric and the Queen Mary's Veteran Hospital doctor's residence</td>
<td>Montreal</td>
</tr>
<tr>
<td>31-May-70</td>
<td>5 bombings in Westmount, 2 deactivated bombs</td>
<td>Montreal</td>
</tr>
<tr>
<td>05-Jun-70</td>
<td>A bomb targeting la Club Canadien goes off</td>
<td>Montreal</td>
</tr>
<tr>
<td>09-Jun-70</td>
<td>Bomb dismantled near a postal substation</td>
<td>Montreal</td>
</tr>
<tr>
<td>16-Jun-70</td>
<td>Two attempted bombings in Montreal at IBM and at Domtar Chemicals research laboratory</td>
<td>Montreal</td>
</tr>
<tr>
<td>16-Jun-70</td>
<td>Explosion at the engineering building at McGill University</td>
<td>Montreal</td>
</tr>
<tr>
<td>18-Jun-70</td>
<td>Dynamite explosion at a post office</td>
<td>Montreal</td>
</tr>
<tr>
<td>19-Jun-70</td>
<td>Bombing at the residence of a Montreal financer</td>
<td>Montreal</td>
</tr>
<tr>
<td>22-Jun-70</td>
<td>Bombing at a Banque Canadienne Nationale branch</td>
<td>Montreal</td>
</tr>
<tr>
<td>24-Jun-70</td>
<td>Bombing at a National Defense communication centre</td>
<td>Ottawa</td>
</tr>
<tr>
<td>24-Jun-70</td>
<td>Bombing at a postal station</td>
<td>Montreal</td>
</tr>
<tr>
<td>26-Jun-70</td>
<td>Attempted bombing of a postal office</td>
<td>Montreal</td>
</tr>
<tr>
<td>03-Jul-70</td>
<td>Bomb explosion at the PetroFina Canada refinery</td>
<td>Montreal</td>
</tr>
<tr>
<td>10-Jul-70</td>
<td>Attempted bombing of a Royal Bank of Canada building</td>
<td>Montreal</td>
</tr>
<tr>
<td>11-Jul-70</td>
<td>Attempted bombing of a Wawanesa Mutual Insurance building</td>
<td>Montreal</td>
</tr>
<tr>
<td>12-Jul-70</td>
<td>Attempted bombing of the Montreal financial district. One of the biggest homemade bombs in North America at the time</td>
<td>Montreal</td>
</tr>
<tr>
<td>16-Jul-70</td>
<td>Attempted bombing of the Hotel Victoria</td>
<td>Montreal</td>
</tr>
<tr>
<td>05-Oct-70</td>
<td>Kidnapping of British Trade Commissioner James Cross</td>
<td>Montreal</td>
</tr>
<tr>
<td>10-Oct-70</td>
<td>Kidnapping of the Quebec Minister of Labour Pierre Laporte.</td>
<td>Montreal</td>
</tr>
<tr>
<td>19-Oct-70</td>
<td>One successful and one failed Molotov cocktail attack</td>
<td>Sherbrooke</td>
</tr>
<tr>
<td>14-Nov-70</td>
<td>Bombing of the Laval City Hall</td>
<td>Montreal</td>
</tr>
</tbody>
</table>
Beginning in the mid-1970s and continuing into the 1980s, Canada experienced a rise in international terrorism, and domestic terrorism, no longer focused in Quebec, was led by the radical group Sons of Freedom (a radical Doukhobor group). There were also a number of domestic attacks by animal rights activists, including the arson and bombing of animal testing facilities, which includes the arson of three Animal Care Centre offices at the University of British Columbia in 1981. The majority of the international attacks, however, were not targeted towards the general public, but towards international consulates, prominent international figures, non-Canadian citizens, or it involved groups taking part in attacks targeting empty establishments during the night. International offices attacked include the Cuban Embassy, the Soviet Consulate, the Romanian Consulate, and the Indian Consulate. Attacks on minorities included assassination attempts, and attacks on the Indian and Doukhobor populations in British Columbia.

Even the Air India bombing in April of 1985, which killed 329, did not directly instill fear into the minds of Canadians as most might believe. After the bombing, many viewed the attack as a non-Canadian issue due to the bombing occurring internationally and the target or audience of the attacks not being directly Canadians, but Indians. Nonetheless, the attack was a failure of Canadian antiterrorism intelligence.

Other than the 1985 Air India bombing, there was no mass casualty Canadian attack from 1970 until 2001. While there were a small number of conspiracies that had the possibility of having mass causalities, they were disrupted before the implementation of the attack. These include the 1991 failed attempt to bomb an occupied Hindu temple and East Indian movie theatre in Toronto that could have killed 5,000. The conspirators were arrested at the United States border.

But while the 1991 Toronto terrorism plot had the potential to kill thousands, it was targeted towards a specific ethnic/religious population, and not the general Canadian public. In 2000, while
not made public until 2011 by the Montreal newspaper La Presse, the Canadian Security Intelligence Service (CSIS) claimed to have intercepted a conversation where blowing up a plane en route to France from Montreal was discussed. A clear example of terrorists planning an attack that was not targeted to a specific group within Canada, but Canadians in general, before-9/11.

In total there were 207 attacks, or 6.74 attacks per year. There was a total of 58 international terrorist events and 149 domestic events, which translates into 4.86 domestic attacks and 1.89 international attacks per year.

Figure 6: Canadian Terrorism Events Count, annual (1970-9/11)

Spikes in significant events (e.g. 1970 October Crisis, 1985 Air India bombing) were seen with a drastic decrease in overall terrorism, and while we did see a rise in internationally motivated events in the 1980s, overall Canada did not experience a large number of casualties from terrorism on its

---

8 For 2001, the percentage of the year before 9/11 is used to estimate attacks per year. The days in 2001 on and before 9/11 equal 69% of the year, thus 1970 – 9/11 is 30.69 years.
soil throughout this time period. And as we will discuss in the policy section, this may be due to Canadian authorities taking terrorism seriously since the October Crisis.

3.2.2 Post-9/11 Terrorism Events in Canada

Directly following the attacks of September 11, 2001, there were three small-scale related terrorism events in Canada that included an attempted arson of an Islamic centre, the arson of a Hindu Samaj Temple, and a general death threat towards Muslims and Jews. Fortunately, Canada did not experience any form of replicated terrorism in the hours or days after 9/11.

Once the initial anger surrounding 9/11 settled, the years that followed experienced relatively little terrorism in Canada. While there still existed a large amount of arson attacks, specifically in Montreal, there does not exist evidence that these events were acts of terrorism, as the motivation and group/individual responsible is not known.

Table 4: Post-9/11 Canadian Terrorism Events, annual (9/11-2013)

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Count</th>
<th>Year</th>
<th>Event Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001 (after 9/11)</td>
<td>3</td>
<td>2008</td>
<td>8</td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
<td>2009</td>
<td>4</td>
</tr>
<tr>
<td>2003</td>
<td>1</td>
<td>2010</td>
<td>6</td>
</tr>
<tr>
<td>2004</td>
<td>3</td>
<td>2011</td>
<td>1</td>
</tr>
<tr>
<td>2005</td>
<td>1</td>
<td>2012</td>
<td>2</td>
</tr>
<tr>
<td>2006</td>
<td>5</td>
<td>2013</td>
<td>4</td>
</tr>
<tr>
<td>2007</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Beginning in 2004, Canada encountered an increase in international terrorism compared to the earlier 2000s. This is highlighted by the 2004 Hamas fire-bombing of a Montreal Jewish elementary school during the night, when the premises was vacant. Similar to the years before
9/11, however, attacks aimed at creating fatalities were limited. Attacks that have injured or killed individuals include the 2006 bathroom bombing in a Tim Horton’s at Toronto’s Yorkville shopping district, killing one, and the attempted assassination of the newly elected Quebec Premier Pauline Marois in 2012 where a security guard was shot dead. Other attacks that have caused injury (but no fatalities) include the 2008 armed assault attack at a café in Edmonton, leaving several people badly beaten. While no one took responsibility for the attack, it is believed to be organized by an anti-Kurd group. Other than these incidents, attacks in the 2000s were focused on corporate interests, with several pipeline bombing occurring in British Columbia in 2008-2009. Other attacks include the series of arsons by the Earth Liberation Front in Guelph, Ontario during 2005-2006. While post-9/11 there have been few significant successful attacks, there have been a few significant foiled attacks that could have caused a large amount of casualties. These foiled attacks include the 2006 Ontario terrorist plot and the 2013 Via Rail terrorist plot.9

Of the six significant conspiracies, four have had Al-Qaeda influences. One that is not listed as influenced by Al-Qaeda, the 2010 foiled Islamist attack in Ottawa, is believed to be influenced by them, but this information was never officially released by Canadian authorities and was primarily press speculation. The 2006 Ontario terrorist plot, with attacks planned for Ottawa and Toronto, is arguably the biggest foiled attack in Canadian history. Eighteen individuals were accused and arrested for planning multiple terrorist attacks, including plans to open fire on the public using firearms, detonate truck bombs, and storm the Canadian Broadcast Centre, the Canadian

---

9 For the purpose of this paper (and following the Sandler and Siqueira (2006) definition), we include foiled attacks as those that Canadian authorities interrupted using their own intelligence. Phoned in threats, accidentally stopping attacks, or attacks that failed during execution are not included as foiled attacks.
Parliament, the parliamentary Peace Tower, CSIS headquarters, and planned to assassinate Canadian political leaders, including the Prime Minister.

Table 5: Significant Foiled Terrorist Attacks Post-9/11

<table>
<thead>
<tr>
<th>Date</th>
<th>City</th>
<th>Province</th>
<th>Audience</th>
<th>Perpetrator</th>
<th>Weapon</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>Ottawa / Toronto</td>
<td>Ontario</td>
<td>Canadian Public</td>
<td>Al-Qaeda</td>
<td>Explosives / Bombs / Firearms</td>
</tr>
<tr>
<td>23/2/2008</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Canadian Public</td>
<td>Al-Qaeda</td>
<td>Unknown</td>
</tr>
<tr>
<td>26/8/2010</td>
<td>Ottawa</td>
<td>Ontario</td>
<td>Canadian Public</td>
<td>Not Released</td>
<td>Explosives / Bombs</td>
</tr>
<tr>
<td>2013</td>
<td>Toronto / Montreal</td>
<td>Ontario / Quebec</td>
<td>Canadian Public</td>
<td>Al-Qaeda</td>
<td>Explosives / Bombs</td>
</tr>
<tr>
<td>2013</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Canadian Public</td>
<td>Individual (Unknown Inspiration)</td>
<td>Explosives / Bombs</td>
</tr>
<tr>
<td>2013</td>
<td>Victoria</td>
<td>British Columbia</td>
<td>Canadian Public</td>
<td>Individual (Al-Qaeda Inspired)</td>
<td>Explosives / Bombs</td>
</tr>
</tbody>
</table>

The three significant conspiracies in 2013 had the potential to be very damaging. The 2013 Via Rail terrorist plot involved two suspects planning to derail and destroy trains in Canada en route from Toronto to New York. Both this attack and the 2006 Ontario plot had the United States authorities assisting Canadian authorities in foiling the attacks, proof that the United States has strong interest in terrorism in Canada. Another 2013 planned terrorist attack included two individuals planning to detonate homemade bombs in a crowd at Canada Day celebration in Victoria, British Columbia. The third was an interrupted suspected attempt to bomb an aircraft en route to Los Angeles from Montreal in October 2013.
Overall there has been 38 terrorist attacks (3.09 per year) from 9/11 until the end of 2013, with 10 international event (0.91 per year) and 28 domestic events (2.27 per year). Compared to pre-9/11 data, this is almost a 100% decrease in every category.

Figure 7: Post-9/11 Canadian Terrorism Events

We can also compare pre-9/11 data to post-9/11 data graphically by using data for each decade. This is done in Figure 8 which shows that there has been a steady decline in terrorism since the 1980s.

While this shows that both domestic and international terrorism have declined steadily, this is not enough evidence to conclude that spending was not needed in the 2000s or that it was effective in ending terrorist activities.

We discussed how Canada has seen a number of foiled attacks after 9/11, which may cause people to argue that the spending was justified and/or effective, but Canadian attacks were being foiled in
the 1990s and 2000s before-9/11, as well. Concluding that the spending was unneeded/ineffective or needed/effective is, therefore, hard to do. It is not possible to know whether terrorists would have been successful had the new policies not been put in place, and it is not possible to know whether new policies would have prevented past attacks, or simply forced terrorists to substitute to different methods. This makes it extremely difficult to draw definitive conclusions on the threat Canada currently faces. The only real conclusion we can make is that Canada is not in a state where it does not need to worry about terrorism. But with different types of threats encountered in the past 8 years, we can at least say that there are some domestic public safety reasons for the spending increase. But without knowing the true impression terrorists have of Canada, we can never be 100% positive on what the threat is.

Figure 8: Average Attacks per year in Canada - per decade (1970-2013)
3.4 Antiterrorism policy in Canada

In addition to the analysis of Canadian events, a look at Canadian policies over this time is helpful. Knowing the historical approach of how Canada has handled terrorism helps us understand the degree of the increase in policy post-9/11, and also provides insight into some of Canada’s motives for various antiterrorism policies.

3.4.1 Pre-9/11 Antiterrorism Measures

Before the events of 9/11 Canada had already been involved in anti-conflict and anti-terror measures independently, and with the United States. Among them is the North American Aerospace Defense Command (NORAD) where Canada has historically contributed much less to the program than the United States, making it a security bargain.\(^\text{10}\) Questioning why the United States would accept this imbalance is a fair question, and the benefits for the United States is having security control over the North through Canadian cooperation.

Canada is also a member of the North Atlantic Treaty Organization (NATO), enacted in 1949. Under Article 5 of the NATO Charter, any form of violent international attack, including transnational terrorism, is included as an attack against NATO (North Atlantic Treaty, 1949). The only time Article 5 was used was after the events of 9/11 with multiple missions to the Middle East, including Operation Anaconda and Operation Active Endeavour.\(^\text{11}\)

Domestically, Canada primarily conducted efforts on their own before-9/11. In response to the FLQ the federal government created the Combined Anti-Terrorist Squad (CATS) that saw the

\(^{10}\) In 1994 Canada contributed a total of 14% to the cost of NORAD, with the United States covered the remaining 86%. Canadian contribution continued to diminish to below 10% in 1997 (Guay, 1998).

\(^{11}\) The involvement of NATO in the Middle-East is not without its critics, however, with NATO members and the public questioning its operations (Granatstein, 2013). A number of NATO members have now pulled out troops from Afghanistan, including Canada, despite NATO not declaring an end to the operation (Granatstein, 2013).
Royal Canadian Mounted Police (RCMP) and the Montreal Police working together to assist in the investigation. CATS was successful until the October Crisis, when Prime Minister Trudeau brought in the military by using the War Measures Act (Charters, 2008). The Act gave the federal government power to maintain peace and order during times of conflict, and it saw the military aiding operations to stop the FLQ.

Following the crisis, the federal government began an internal review of the Canadian intelligence community which resulted in a number of subcommittees and groups being created. These included the Security Planning and Research Group within the Department of the Solicitor General in 1971, the Intelligence Advisory Committee (IAC), the Security Advisory Committee (SAC), and the Interdepartmental Committee on Security and Intelligence (ICSI) (Charters, 2008). Military spending did not increase because of the October Crisis, and in fact decreased steadily over Trudeau’s time as Prime Minister, including cuts to NATO and NORAD (Granatstein, 2002, 2013).

Following another internal review of antiterrorism policy in the 1980s (after the MacDonald Commission found that the RCMP should not be designated for both policing and national intelligence) the Canadian Security Intelligence Service (CSIS) was created in 1984. CSIS has since played a growing role in antiterrorism measures, being the centre for gathering intelligence and coordinating responses on threats and attacks. CSIS now works on, among others, investigating threats, assessing threats through the Integrated Threat Assessment Centre (ITAC), providing security screening, assisting law enforcement, and providing advice to the Federal Government (“Backgrounder No.8 – Counter-Terrorism”, 2007).
Canada again faced a terrorism crisis in 1985 with the Air India bombing. In response the federal government began a review of airport and airline security.\textsuperscript{12} New antiterrorism policies were put in place following the attack, but the response by the international community, specifically the United States, was that it was a Canadian security issue and not a global issue. New antiterrorism technology and policies for air transportation, including the prevention of unaccompanied baggage being allowed on flights, were not universally adopted (Major, 2010). The failure of Canada to prevent the Air India bombing and the failure of the international community to introduce new airline security measures have been well-scrutinized (Major, 2010). Canada itself implemented full baggage screening following the 1985 attack, however due to delays and high costs the program was terminated and replaced by new communication and intelligence measures (Major, 2010).\textsuperscript{13}

The 1980s also saw Canada introduce new terrorism response measures. To assist police respond to incidents, the RCMP created the Special Emergency Response Team (SERT) in 1986. SERT was given the responsibility of responding to events outside the capabilities of local officers. SERT was not given any international power, however, and increasingly came under scrutiny by other Canadian agencies. To deal with international interests in terrorism and to assist the RCMP budget cuts in the early 1990s, the federal government gave international and domestic power to the Canadian forces’ Joint Task Force 2 and disbanded SERT at the recommendation of diplomat Robert Fowler (Boer, 2005).

\textsuperscript{12} While it is debated whether the attack was truly against Canadian interests or not, the fact is that Canadian security failed to prevent the deaths of 329 individuals, including 268 Canadians.

\textsuperscript{13} The Canadian Air Transport Security Authority (CATSA) spent approximately $576.4 million in the fiscal year of 2012-2013, bringing an hourly total cost (assuming 24 hour work days) of $65,755 (not including lost airline revenues). This is much higher than the estimated $38,000 cost of the new airline security measures put in place following the Air India bombing.
Further antiterrorism developments included the creation of the National Security Coordination Centre (NSCC) and the National Counter-Terrorism Plan (NCTP) in 1989. One of the key roles of the NCTP was to plan the response to threats and attacks (Charters, 2008). The NSCC would be in charge of coordinating the response to incidents and providing further assistance to police (Charters, 2008).

Canada continued to be active in implementing antiterrorism measures throughout the 1990s, and while at times its effectiveness was questioned (CATS in 1970 and the RCMP during the early 1990s), Canada continued to attempt to improve its methods of combating and responding to potential events. So, while Canadian efforts increased after 9/11 (its analysis follows), it is not surprising given Canada’s response to terrorism in the past and its strong security relationship with the United States.

3.4.2 Post-9/11 Antiterrorism Measures

“Canada had to react both to the terrorist attacks and to the US reaction to the attacks”

Kitchen and Sasikumar (2009)

Without a doubt 9/11 changed the security world. Both Canada and the United States, along with many other countries introduced a number of new antiterrorism policies, with the United States leading the way. With Canada seen by the United States as a possible place from where terrorists gain access to the United States, border security at the North was a growing issue for Washington. Prime-Minister Jean-Chretien did not immediately join the War on Terror, but eventually agreed to send troops to Afghanistan under Article 5 of NATO and to assist in increasing security along the Canada-United States border (Granatstein, 2002). As a result of joining the War on Terror, National Defense had to increase spending dramatically to pay for more troops, increase training,
and upgrade outdated technology (Granatstein, 2002). Military cutbacks of the 1990s had caught up to Canada, who now had to advance their military at an unprecedented pace in order to make a presence.  

Kitchen and Sasikumar (2009) argue that the United States would not have hesitated to impose economic sanctions and border crossing restrictions on Canada had they not cooperated. Historically the United States has shown that they are not afraid to secretly investigate and cut ties with long standing allies, having spied on allies within the United Nations, and specifically investigating how Sweden and Norway deal with terrorists after becoming concerned (Kitchen and Sasikumar, 2009). Granatstein (2002) uses examples from the past to show that the United States has used diplomatic pressure on the Canadian government to adopt their way. Some examples he uses include Canadian forces being forced to enter the Korean War, and the Bomarc Missile Crisis. The initial rejection by Prime Minister John Diefenbaker to include Nuclear Warheads on Bomarcs in Canada frustrated John F. Kennedy’s administration, and eventually led to the fall of Diefenbaker’s conservative government and the use of Nuclear Bomarcs in Canada (Granatstein, 2002).

Following 9/11, Canadian policies were implemented in a similar fashion and timing to those of the United States, possibly to avoid political kickback from Washington. As the following table 6 shows, almost all post-9/11 antiterrorism security measures introduced by Canada where first similarly introduced by the United States, showing hints that there exists some degree of (forced)

---

14 It can be argued that even without 9/11, Canadian force were due for an upgrade anyways, due to drastic increases in technology throughout the 1990s and early 2000s. This is also part of the reason that knowing whether the increase in spending was strictly for antiterrorism efforts, or needed upgrades.
cooperation. For example, on November 19, 2001 the Transportation Security Administration (TSA) was formed in the United States to protect public transportation and subsequently, CATSA was formed on April 1, 2002 to protect Canadians travelling by air.

Table 6: Examples of Antiterrorism Measures Introduced Post-9/11

<table>
<thead>
<tr>
<th>Measures</th>
<th>USA</th>
<th>CANADA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghan War</td>
<td>October 7, 2001</td>
<td>January, 2002</td>
</tr>
<tr>
<td>Antiterrorism Legislation:</td>
<td>October 26, 2001</td>
<td>December 18, 2001</td>
</tr>
<tr>
<td>Anti-Terrorism/PATRIOT Act</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airport Security: CATSA/TSA</td>
<td>November 19, 2001</td>
<td>April 1, 2002</td>
</tr>
<tr>
<td>Smart Border Declaration</td>
<td>December 12, 2001</td>
<td>December 12, 2001</td>
</tr>
<tr>
<td>National Security Entry-Exit Registration System</td>
<td>September, 2002</td>
<td>Did not Introduce Similar Policy</td>
</tr>
<tr>
<td>USNORTHCOM (United States Northern Command)</td>
<td>April 25, 2002</td>
<td>Protected under it as territorial and national interest</td>
</tr>
<tr>
<td>Increase in US Missile Defense Program</td>
<td>Yes</td>
<td>Rejected joining the program in February 25, 2005</td>
</tr>
<tr>
<td>Sky Marshalls: CACPP/FAMS</td>
<td>Enhanced post-9/11</td>
<td>September 17, 2002</td>
</tr>
<tr>
<td>Iraq War</td>
<td>March 20, 2003</td>
<td>Did Not Take Part</td>
</tr>
<tr>
<td>No Fly List</td>
<td>Pre June, 2005</td>
<td>June, 2007</td>
</tr>
<tr>
<td>Passport Requirement</td>
<td>June, 2009</td>
<td>June, 2009</td>
</tr>
</tbody>
</table>

Of the measures pushed by the United States, only three that we examine were rejected by Canada. These are the Iraq War, the National Security Entry-Exit Registration System, and the Missile Defense Program. The first to be rejected was the Iraq War, which pleased the majority of the Canadian public who saw it as unneeded and unnecessary (Delvoie, 2004). The Missile Defense Program was heavily debated among Canadian politicians before being rejected. There was

---

15 By no means is this meant to be a complete list however, as some antiterrorism measures may not have been made public.
criticism that not joining the program would hurt Canada-United States relations, (Granatstein, 2002) but it was eventually rejected in 2005 under moral grounds and to show to the international community that Canada did in fact have an independent voice.¹⁶

These programs were not the only programs that the Canadian government was against, as many were still put in place at the requisition of the United States despite the Canadian government actively speaking against them. One of the programs is the United States’ legislation that requires all foreign citizens to require a passport to enter the United States by either land or air. As Kitchen and Sasikumar (2009) mention, the loss to the Canadian economy because of the requirement was estimated to be in the billions of dollars. Much to the Canadian government’s (and public’s) dismay, both the United States and Canada introduced policies that required foreigners to present a passport before entering the country on June 1, 2009. Another policy the Canadian Government was against was the creation of a no fly-list. However, under mass pressure by the American authorities, and a threat to not allow overflight rights of Canadian airlines in the United States, Canada created and now maintains a no-fly list, be it smaller and less comprehensive than the American version (Kitchen and Sasikumar, 2009).

Canadian antiterrorism efforts increased following 9/11 and were clearly influenced by the United States. This is due to the United States having a strong interest in Canada and being concerned that terrorists could enter the United States from Canada. As mentioned, it is extremely difficult to draw conclusions on the effectiveness of the policies. It is impossible to know if these new policies would have prevented the Air India bombing or forced terrorists to substitute to another method.

---

¹⁶ Granatstein (2002) proposed that Canada join the program.
of succeeding. It is also impossible to know if the old policies would have been less, more, or equally effectiveness as the new policies.

To complete our analysis of Canadian terrorism policies, we now examine post-9/11 spending.

### 3.4.3 Post-9/11 Antiterrorism Spending

In terms of antiterrorism spending, Canada has become under attack by the media and a number of reports arguing that the current amount of spending is beyond the means of the government or that it is an improper use of funds (see McDonald, 2011). The intractability of $3.1 billion of antiterrorism spending distributed to government departments and agencies from 2001 to 2009 reported by the 2013 General Auditor Report did not help the government’s argument that it is money well-spent. MacDonald (2011) argues that from 2001 to 2011, $68 billion (2011 CAD) was allocated to increase national security and public safety, which is higher than the $12.9 billion from the General Auditor Report. The General Auditor’s number could possibly be a lower-bound given possible increase in spending due to indirect antiterrorism efforts (e.g. the creation of the CBSA). As well, MacDonald’s (2011) estimates, along with our own, should be considered an upper-bound as it is not possible to differentiate antiterrorism from non-antiterrorism related spending using the data the federal government provides.

To provide an up-to-date value of the spending we perform a similar estimation to that of MacDonald (2011). Departments, agencies and programs MacDonald (2011) uses in his calculations include National Defense, Foreign Affairs & International Trade, Security and Public Safety Programs, Justice & Legal Programs, the RCMP, the Canadian Border Security Agency (CBSA), CSIS, Public Safety and Emergency Preparedness, and Correctional Services.\(^{17}\) Using

\(^{17}\) Noticeably missing is CATSA.
the same source (Parts I & II of the Federal Government’s Expense Plan and Main Estimates) and some of MacDonald’s (2011) data, we can do a similar analysis using data from the 2000-2001 to the 2013-2014 fiscal year.\textsuperscript{18} This allows us to calculate spending since his report came out in 2011. We also include CATSA spending, as it was created post-9/11 and is directly related to the antiterrorism efforts of the federal government. Given that the entire budget of these departments is not fully allocated towards antiterrorism measures, it prohibits the use of empirical method of analysing the effectiveness of the spending, as the increased spending is most likely not all due to terrorism (e.g. needed increases due to technological advances), and it is not possible to know whether they would have increased without 9/11.

All programs, excluding CBSA and CATSA (created after 2001), have seen dramatic increases in spending since the 2000-2001 fiscal year. These increases are highlighted in Figures 9 through 17. As a percentage change, National Defense spending has increased by 160.59% since 2000-2001. This is down from a fiscal year high increase of 184.64% in 2012-2013. RCMP spending has increased by 170.62%, down from a high of 188.90%. CBSA spending has increased 215.22%, down from a high of 264.09% in 2012-2013, and CSIS has seen an increase of 267.33%, down from a high of 288.92% in 2012-2013. The biggest increase since the War on Terror started in 2001 belongs to Public Safety and Emergency Preparedness, which has seen an increase in spending of 470.70% since the 2000-2001 fiscal year, with its highest spending coming in 2012-2013 at 670.60% higher than 2000-2001 spending. This increase can be attributed to the creation of Public Safety Canada (established in 2003) that has since been in charge of protecting the public and maintaining a peaceful and safe society.

\textsuperscript{18} Values for 2013-2014 are estimates, and may not reflect actual spending. MacDonald’s numbers were double checked to insure accuracy.
Figure 9: Percentage Increase in Canadian Antiterrorism Spending (fiscal year, 2000-2013)

Source: MacDonald (2011) and the Federal Government’s Expense Plan and Main Estimates Part I & II

% increase

Correctional Services  
RCMP: % change from 2000-01 to 2013-14  
CBSA  
CSIS  
Public Safety and National Defense  
Emergency Preparedness  
Foreign Affairs & International Trade  

% change from 2000-01 to Highest Spending Year in past Decade
Figure 10: Correctional Services spending (fiscal year, 2000-2013)

Source: MacDonald (2011) and the Federal Government’s Expense Plan and Main Estimates Part I & II

Figure 11: FIAT spending (fiscal year, 2000-2013)

Source: MacDonald (2011) and the Federal Government’s Expense Plan and Main Estimates Part I & II

Figure 12: Public Safety and Emergency Preparedness spending (fiscal year, 2000-2013)

Source: MacDonald (2011) and the Federal Government’s Expense Plan and Main Estimates Part I & II

Figure 13: National Defense spending (fiscal year, 2000-2013)

Source: MacDonald (2011) and the Federal Government’s Expense Plan and Main Estimates Part I & II
Figure 14: CSIS spending (fiscal year, 2000-2013)

Figure 15: CBSA spending (fiscal year, 2000-2013)

Figure 16: RCMP spending (fiscal year, 2000-2013)

Figure 17: CATSA spending (fiscal year, 2000-2013)
One of the most secretive spending programs of the federal government and the Department of National Defense is the Communications Security Establishment of Canada (CSEC). Spending before 2011 was mostly speculative, but it is believed that the overall spending by the CSEC has doubled since 9/11. The 2013-14 estimate to date of 2012-13 CSEC spending is currently over $415 million. While in total CSEC was about two percent of total National Defense spending in 2012-13, this shows how large the Canadian Department of National Defense is. CSEC is a good example of increased spending that may or may not be due to terrorism, as it is directly correlated with advances in technology, and data mining is a lucrative business that has advantages for the government outside of stopping terrorism.

**Figure 18: CSEC Spending - part of National Defense (fiscal year, 2000-2013)**

![Graph showing CSEC spending](UNKNOWN)

Source: MacDonald (2011) and the Federal Government’s Expense Plan and Main Estimates Part I & II

In total, from 2001 until 2013 we calculate an increase in security and public safety spending of $160.75 billion (2013 CND). From 2001 until 2011, an increase of $122.67 billion (to compare to MacDonald’s (2011) value of $68 billion), and from 2001 until 2009, an increase of $85.27 billion
(to compare to the 2013 General Auditor’s Report of $12.9 billion). The cause in difference between our calculation and MacDonald’s (2011) may be from the use of different departments, different interest rates used, and our analysis being in 2013 Canadian dollars as opposed to 2011 or nominal dollars.

It is clear that most departments that take part in antiterrorism measures have greatly increased their spending, and it can safely be assumed that this increase is partially (if not mostly) due to 9/11 and that the underlining motivations, given the policies and programs being implemented directly related to ending terrorism, and the creation of new federal departments (e.g. Public Safety Canada).

In conclusion, we have shown, by analyzing the history of terrorist events in Canada, that there does exist, at least to some degree, a threat of large-scale terrorism in Canada. This provides a public safety reason for the antiterrorism spending. We did not determine, however, what specific level of threat Canada is at due to its difficulty. We have also shown through analyzing post-9/11 policies that the United States plays a significant role in Canada’s antiterrorism decisions, with similar programs being implemented in close proximity to each other. By pleading for higher Canadian antiterrorism measures, the United States has also shown that they are highly interested in what Canada does (or does not) implement. This is most likely due to Canadian policies affecting the fight against terrorism in the United States. Also, while not explicitly mentioned in this chapter, with Canadian businesses being intertwined with the American economy, there is a motive for Canada to assist in preventing attacks on American soil to limit the significant declines seen in many sectors of the Canadian economy following 9/11.

In the next chapter we conduct our theoretical analysis. This is combined with a literature review of relevant theoretical models to gain knowledge on previous work, and to determine to what extent
the literature provides models on analysing government antiterrorism policy choices and spending levels.

3.5 Canadian Terrorism Event List (1970-2013)

The following table beginning on the next page provides a comprehensive list of terrorism events from January 1, 1970 to December 31, 2013. All events have been subject to the Sandler and Siqueira (2006) definition of terrorism. For reference, the definition is:

Terrorism is the premeditated use, or threat of use, of extra-normal violence by individuals or subnational organizations to obtain a political objective through intimidation or fear directed at an audience beyond the immediate victim. (p. 1372, para. 1).

Details for each event include the day, month, and year of the attack. Also included is the perpetrator (if known), the city and province of the (planned) attack, the type of attack, the number of fatalities and injuries, whether the attack was domestic or international, and the source of the information.
<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Day</th>
<th>Perpetrators</th>
<th>City</th>
<th>Province</th>
<th>Attack Type</th>
<th>Fatalities</th>
<th>Injuries</th>
<th>International</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>2</td>
<td>26</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Kidnapping</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>5</td>
<td>7</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>1</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>5</td>
<td>24</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>5</td>
<td>28</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>5</td>
<td>31</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>3</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>5</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>1</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>9</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>16</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>16</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>18</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>19</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>22</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>24</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>26</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>6</td>
<td>28</td>
<td>Individual</td>
<td>Grand Forks</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1970</td>
<td>7</td>
<td>3</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>Year</td>
<td>FLQ</td>
<td>Location</td>
<td>Event</td>
<td>Domestic</td>
<td>International</td>
<td>Solicitors Report 1991</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>--------------</td>
<td>----------</td>
<td>----------</td>
<td>---------------</td>
<td>------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>7</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Solicitors Report 1991</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>7</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Solicitors Report 1991</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>7</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Solicitors Report 1991</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>7</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Solicitors Report 1991</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>7</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Solicitors Report 1991</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>10</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>1</td>
<td>International</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>10</td>
<td>Montreal</td>
<td>Bombing</td>
<td>1</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>10</td>
<td>Sherbrooke</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>11</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>11</td>
<td>Toronto</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>1</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>1</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>1</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>2</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>3</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>6</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>6</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>7</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>9</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>9</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>#</td>
<td>Date</td>
<td>Group</td>
<td>Location</td>
<td>Type</td>
<td>Domestic</td>
<td>International</td>
<td>Solicitors Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>---</td>
<td>------</td>
<td>---------------------</td>
<td>----------</td>
<td>------------</td>
<td>----------</td>
<td>---------------</td>
<td>--------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>9</td>
<td>25</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>10</td>
<td>17</td>
<td>Canadian Hungarian Freedom Fighters</td>
<td>Ottawa</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>10</td>
<td>18</td>
<td>Canadian Hungarian Freedom Fighters</td>
<td>Ottawa</td>
<td>Armed Assault</td>
<td>0</td>
<td>1</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>10</td>
<td>29</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>11</td>
<td>8</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>11</td>
<td>10</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>12</td>
<td>3</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>12</td>
<td>4</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>12</td>
<td>4</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>12</td>
<td>5</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>1</td>
<td>23</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>1</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>1</td>
<td>26</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>1</td>
<td>28</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>3</td>
<td>29</td>
<td>Unknown</td>
<td>Ottawa</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>4</td>
<td>3</td>
<td>Unknown</td>
<td>Ottawa</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>4</td>
<td>4</td>
<td>Young Cubans</td>
<td>Montreal</td>
<td>Bombing</td>
<td>1</td>
<td>1</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>9</td>
<td>20</td>
<td>Black September</td>
<td>Ottawa</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Month</td>
<td>Day</td>
<td>Group/Individual</td>
<td>Location</td>
<td>Province</td>
<td>Event Type</td>
<td>Number of Deaths</td>
<td>Number of Injuries</td>
<td>Authority</td>
<td>Reference</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-----</td>
<td>------------------</td>
<td>-------------------</td>
<td>--------------</td>
<td>------------</td>
<td>------------------</td>
<td>-------------------</td>
<td>--------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>1973</td>
<td>1</td>
<td>25</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1974</td>
<td>1</td>
<td>21</td>
<td>Cuban Action</td>
<td>Ottawa</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>RCMP</td>
</tr>
<tr>
<td>1974</td>
<td>1</td>
<td>29</td>
<td>National Liberation Front of Cuba</td>
<td>Ottawa</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>RCMP</td>
</tr>
<tr>
<td>1974</td>
<td>2</td>
<td>12</td>
<td>Jewish Defense League</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>RCMP</td>
</tr>
<tr>
<td>1975</td>
<td>3</td>
<td>30</td>
<td>Sons of Freedom</td>
<td>Brilliant</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1976</td>
<td>9</td>
<td>22</td>
<td>Cuban Communists</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>RCMP</td>
</tr>
<tr>
<td>1977</td>
<td>1</td>
<td>9</td>
<td>Sons of Freedom</td>
<td>Passmore</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1977</td>
<td>9</td>
<td>1</td>
<td>Sons of Freedom</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Bombing</td>
<td>3</td>
<td>0</td>
<td>International</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1977</td>
<td>9</td>
<td>21</td>
<td>Sons of Freedom</td>
<td>Grand Forks</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1977</td>
<td>11</td>
<td>19</td>
<td>Universal Proutist Revolutionary Front</td>
<td>Ottawa</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1978</td>
<td>2</td>
<td>2</td>
<td>Beaubassin Cell</td>
<td>St. Quentin</td>
<td>New Brunswick</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1978</td>
<td>7</td>
<td>28</td>
<td>Sons of Freedom</td>
<td>Grand Forks</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1978</td>
<td>9</td>
<td>23</td>
<td>Sons of Freedom</td>
<td>Brilliant</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1979</td>
<td>5</td>
<td>13</td>
<td>Sons of Freedom</td>
<td>Slocan Park</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1979</td>
<td>9</td>
<td>30</td>
<td>Sons of Freedom</td>
<td>South Slocan</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>Year</td>
<td>No.</td>
<td>No. of Deaths</td>
<td>Group Name</td>
<td>Location</td>
<td>Offence</td>
<td>Domestic/International</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>---------------</td>
<td>------------</td>
<td>----------</td>
<td>----------</td>
<td>------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>1</td>
<td>14</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>3</td>
<td>28</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>3</td>
<td>29</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>3</td>
<td>30</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>4</td>
<td>1</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>4</td>
<td>3</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>5</td>
<td>25</td>
<td>Doukhobor fundamentalist extremists</td>
<td>Christina Lake</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>9</td>
<td>13</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>9</td>
<td>26</td>
<td>Unknown</td>
<td>South Slocan</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>11</td>
<td>5</td>
<td>Sons of Freedom</td>
<td>Robson</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1980</td>
<td>12</td>
<td>22</td>
<td>Alliance of Cuban Revolutionary Organizations</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1981</td>
<td>1</td>
<td>3</td>
<td>Unknown</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1981</td>
<td>1</td>
<td>24</td>
<td>Unknown</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1981</td>
<td>1</td>
<td>31</td>
<td>Unknown</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1981</td>
<td>2</td>
<td>11</td>
<td>Unknown</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1981</td>
<td>2</td>
<td>15</td>
<td>Unknown</td>
<td>Merritt</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1981</td>
<td>4</td>
<td>26</td>
<td>Sons of Freedom</td>
<td>Ootechenia</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>Year</td>
<td>Month</td>
<td>Day</td>
<td>Description</td>
<td>Location</td>
<td>Type</td>
<td>Victims</td>
<td>Suspects</td>
<td>Notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-----</td>
<td>-----------------------------------------</td>
<td>--------------</td>
<td>---------------</td>
<td>---------</td>
<td>----------</td>
<td>--------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>5</td>
<td>25</td>
<td>Unknown</td>
<td>Mtsqui</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>6</td>
<td>28</td>
<td>Sons of Freedom</td>
<td>Brilliant</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>6</td>
<td>29</td>
<td>Sons of Freedom</td>
<td>Castlegar</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>6</td>
<td>29</td>
<td>Unknown</td>
<td>Christina Lake</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>10</td>
<td>4</td>
<td>Unknown</td>
<td>South Slocan</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>10</td>
<td>5</td>
<td>Sons of Freedom</td>
<td>Grand Forks</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>10</td>
<td>27</td>
<td>Unknown</td>
<td>Farron</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>1</td>
<td>5</td>
<td>Armenian Secret Army for the Liberation of Armenia</td>
<td>Toronto</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>4</td>
<td>8</td>
<td>Armenian Secret Army for the Liberation of Armenia</td>
<td>Ottawa</td>
<td>Assassination</td>
<td>0</td>
<td>1</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>5</td>
<td>4</td>
<td>Direct Action</td>
<td>Vancouver Island</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Huffington Post</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>5</td>
<td>7</td>
<td>Armenian Secret Army for the Liberation of Armenia</td>
<td>Toronto</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>8</td>
<td>27</td>
<td>Justice Commandos</td>
<td>Ottawa</td>
<td>Assassination 1</td>
<td>0</td>
<td></td>
<td>International Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>11</td>
<td>20</td>
<td>Francophon and Anglophone group</td>
<td>Montreal</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>11</td>
<td>22</td>
<td>Wimmins Fire Brigade</td>
<td>vancouver</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Month</td>
<td>Day</td>
<td>Event</td>
<td>Location</td>
<td>Province</td>
<td>Type</td>
<td>Number</td>
<td>Inventory</td>
<td>Source</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-----</td>
<td>-------</td>
<td>----------</td>
<td>----------</td>
<td>------</td>
<td>--------</td>
<td>-----------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>12</td>
<td>11</td>
<td>Friction directe</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1983</td>
<td>4</td>
<td>10</td>
<td>Direct Action</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>RCMP</td>
</tr>
<tr>
<td>1983</td>
<td>4</td>
<td>15</td>
<td>Direct Action</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1983</td>
<td>5</td>
<td>5</td>
<td>Direct Action</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1983</td>
<td>5</td>
<td>10</td>
<td>Friction directe</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1983</td>
<td>7</td>
<td>29</td>
<td>Unknown</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1984</td>
<td>4</td>
<td>30</td>
<td>Sons of Freedom</td>
<td>Gilpin</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1984</td>
<td>5</td>
<td>31</td>
<td>Unknown</td>
<td>South Slocan</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1984</td>
<td>6</td>
<td>2</td>
<td>Unknown</td>
<td>Krestova</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1984</td>
<td>6</td>
<td>4</td>
<td>Individual</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Armed Assault</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>Toronto Star</td>
</tr>
<tr>
<td>1984</td>
<td>6</td>
<td>29</td>
<td>Sons of Freedom</td>
<td>Castlegar</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1984</td>
<td>8</td>
<td>21</td>
<td>Unknown</td>
<td>South Slocan</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1985</td>
<td>2</td>
<td>8</td>
<td>Individual</td>
<td>British Columbia</td>
<td>Armed Assault</td>
<td>0</td>
<td>1</td>
<td>Domestic</td>
<td>RCMP</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>3</td>
<td>12</td>
<td>Armenian Revolutionary Army</td>
<td>Ottawa</td>
<td>Ontario</td>
<td>Armed Assault</td>
<td>1</td>
<td>1</td>
<td>International</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1985</td>
<td>4</td>
<td>13</td>
<td>Sons of Freedom</td>
<td>Gilpin</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1985</td>
<td>6</td>
<td>23</td>
<td>Kashmir Liberation Army, Sikh Student Federation, and the Sikh Tenth Regiment</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>329</td>
<td>0</td>
<td>International</td>
<td>Public Safety Canada</td>
</tr>
<tr>
<td>1985</td>
<td>9</td>
<td>8</td>
<td>Sons of Freedom</td>
<td>Castlegar</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>Year</td>
<td>No</td>
<td>No.</td>
<td>Type</td>
<td>Location</td>
<td>Province</td>
<td>Nature</td>
<td>billed</td>
<td>billed</td>
<td>Solicitors Report 1991</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----</td>
<td>-----</td>
<td>------</td>
<td>----------</td>
<td>----------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------------------------</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>11</td>
<td>4</td>
<td>Unknown</td>
<td>Grand Forks</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>1</td>
<td>20</td>
<td>Aid terrorist organization</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Armed Assault</td>
<td>0</td>
<td>1</td>
<td>International</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>1</td>
<td>26</td>
<td>Unknown</td>
<td>Surrey</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>RCMP</td>
</tr>
<tr>
<td>1986</td>
<td>2</td>
<td>16</td>
<td>Roman Revenge</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Armed Assault</td>
<td>1</td>
<td>0</td>
<td>International</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>2</td>
<td>19</td>
<td>Unknown</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1986</td>
<td>5</td>
<td>25</td>
<td>International Sikh Youth Federation</td>
<td>Gold River</td>
<td>British Columbia</td>
<td>Armed Assault</td>
<td>0</td>
<td>1</td>
<td>International</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>6</td>
<td>1</td>
<td>Individual</td>
<td>Surrey</td>
<td>British Columbia</td>
<td>Armed Assault</td>
<td>0</td>
<td>1</td>
<td>International</td>
<td>RCMP</td>
</tr>
<tr>
<td>1986</td>
<td>8</td>
<td>3</td>
<td>Sons of Freedom</td>
<td>Grand Forks</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1986</td>
<td>9</td>
<td>15</td>
<td>Direct Action</td>
<td>Cedar</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>9</td>
<td>24</td>
<td>Sons of Freedom</td>
<td>Gilpin</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1986</td>
<td>12</td>
<td>23</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1986</td>
<td>12</td>
<td>24</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1987</td>
<td>6</td>
<td>27</td>
<td>New Revivalists of the Nationsozialistische Deutsche Arbeiterpartei</td>
<td>Calgary</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1987</td>
<td>9</td>
<td>28</td>
<td>Individual</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1988</td>
<td>6</td>
<td>8</td>
<td>Individual</td>
<td>Calgary</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>RCMP</td>
</tr>
<tr>
<td>1988</td>
<td>8</td>
<td>26</td>
<td>Individual</td>
<td>Surrey</td>
<td>British Columbia</td>
<td>Armed Assault</td>
<td>0</td>
<td>1</td>
<td>International</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>2</td>
<td>21</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Solicitors Report 1991</td>
</tr>
<tr>
<td>1989</td>
<td>4</td>
<td>7</td>
<td>Individual</td>
<td>Ottawa</td>
<td>Ontario</td>
<td>Hijacking</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Month</td>
<td>Day</td>
<td>Group/Name</td>
<td>Location</td>
<td>Crime</td>
<td>Resolved</td>
<td>Agency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-----</td>
<td>------------</td>
<td>---------</td>
<td>-------</td>
<td>----------</td>
<td>--------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>4</td>
<td>24</td>
<td>Animal Liberation Front</td>
<td>Vancouver</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>8</td>
<td>9</td>
<td>FLQ</td>
<td>Montreal</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic Solicitors Report 1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>3</td>
<td>14</td>
<td>Unknown</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Assassination</td>
<td>0</td>
<td>1</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>3</td>
<td>27</td>
<td>Unknown</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Assassination</td>
<td>0</td>
<td>1</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>4</td>
<td>6</td>
<td>Unknown</td>
<td>Calgary</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>4</td>
<td>17</td>
<td>Unknown</td>
<td>Pemberton</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>4</td>
<td>20</td>
<td>Unknown</td>
<td>Pemberton</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>6</td>
<td>30</td>
<td>Unknown</td>
<td>Winnipeg</td>
<td>Manitoba</td>
<td>Unarmed Assault</td>
<td>1</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>10</td>
<td>3</td>
<td>Jamaat ul Fuqra</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International The Star</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>10</td>
<td>31</td>
<td>Unknown</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Armed Assault</td>
<td>0</td>
<td>1</td>
<td>International RCMP</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>12</td>
<td>17</td>
<td>Animal Liberation Front</td>
<td>Edmonton</td>
<td>Alberta</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>1</td>
<td>3</td>
<td>Animal Rights Militia</td>
<td>British Columbia</td>
<td>Food-tampering</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>1</td>
<td>24</td>
<td>Unknown</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>4</td>
<td>5</td>
<td>Anti-Iran Government Exiles</td>
<td>Ottawa</td>
<td>Ontario</td>
<td>Unarmed Assault</td>
<td>0</td>
<td>1</td>
<td>International GTD</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>5</td>
<td>18</td>
<td>Unknown</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>5</td>
<td>19</td>
<td>Unknown</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Assassination</td>
<td>0</td>
<td>1</td>
<td>International GTD</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>6</td>
<td>1</td>
<td>Animal Liberation Front</td>
<td>Edmonton</td>
<td>Alberta</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic Robert Burke</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>9</td>
<td>17</td>
<td>Unknown</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Assassination</td>
<td>1</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>11</td>
<td>30</td>
<td>Skinhead gang</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Assassination</td>
<td>1</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>12</td>
<td>6</td>
<td>Unknown</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Assassination</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>2</td>
<td>5</td>
<td>Unknown</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Unarmed Assault</td>
<td>0</td>
<td>1</td>
<td>International RCMP</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>5</td>
<td>16</td>
<td>Unknown</td>
<td>Clayoquot Sound</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>6</td>
<td>6</td>
<td>Individual</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Unarmed Assault</td>
<td>0</td>
<td>1</td>
<td>International RCMP</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>8</td>
<td>23</td>
<td>Individual</td>
<td>Camp Ipperwash</td>
<td>Ontario</td>
<td>Armed Assault</td>
<td>0</td>
<td>0</td>
<td>Domestic The Globe and Mail</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Month</td>
<td>Day</td>
<td>Location</td>
<td>Province</td>
<td>Event Type</td>
<td>Description</td>
<td>Source</td>
<td>Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-----</td>
<td>----------</td>
<td>----------</td>
<td>------------</td>
<td>-------------</td>
<td>--------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>3</td>
<td>14</td>
<td>Cornwall</td>
<td>Ontario</td>
<td>0</td>
<td>0</td>
<td>GTD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>3</td>
<td>20</td>
<td>Quebec</td>
<td>Quebec</td>
<td>0</td>
<td>0</td>
<td>GTD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>5</td>
<td>26</td>
<td>Unknown</td>
<td>Toronto</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International RCMP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>11</td>
<td>8</td>
<td>Army of God</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Assassination</td>
<td>0</td>
<td>1</td>
<td>Domestic GTD</td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>12</td>
<td>23</td>
<td>Animal Rights Militia</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Food-tampering</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>4</td>
<td>28</td>
<td>Unknown</td>
<td>Cranbrook</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>6</td>
<td>19</td>
<td>Unknown</td>
<td>British Columbia</td>
<td>British Columbia</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>7</td>
<td>11</td>
<td>Militant Direct Action Task Force</td>
<td>Calgary</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>7</td>
<td>12</td>
<td>Militant Direct Action Task Force</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>7</td>
<td>15</td>
<td>Unknown</td>
<td>Spallumcheen</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>7</td>
<td>19</td>
<td>Earth Liberation Army</td>
<td></td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>11</td>
<td>1</td>
<td>Individual</td>
<td></td>
<td></td>
<td>Assassination</td>
<td>0</td>
<td>0</td>
<td>International RCMP</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>11</td>
<td>10</td>
<td>Army of God</td>
<td>Hamilton</td>
<td>Ontario</td>
<td>Assassination</td>
<td>0</td>
<td>1</td>
<td>Domestic GTD</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>12</td>
<td>1</td>
<td>Justice Department</td>
<td>British Columbia</td>
<td></td>
<td>HIV Threat</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>2</td>
<td>1</td>
<td>Unknown</td>
<td>British Columbia</td>
<td></td>
<td>Food-tampering</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>3</td>
<td>1</td>
<td>Justice Department</td>
<td>Calgary</td>
<td>Alberta</td>
<td>HIV Threat</td>
<td>0</td>
<td>0</td>
<td>Domestic RCMP</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>4</td>
<td>29</td>
<td>Unknown</td>
<td>Calgary</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>1</td>
<td>Domestic GTD</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>11</td>
<td>11</td>
<td>Army of God</td>
<td>Winnipeg</td>
<td>Manitoba</td>
<td>Assassination</td>
<td>0</td>
<td>1</td>
<td>Domestic GTD</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>11</td>
<td>25</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic GTD</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>1</td>
<td>4</td>
<td>White Power</td>
<td>Surrey</td>
<td>British Columbia</td>
<td>Unarmed Assault</td>
<td>1</td>
<td>0</td>
<td>International RCMP</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>8</td>
<td>2</td>
<td>Unknown</td>
<td>Demmit</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic GTD</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>10</td>
<td>14</td>
<td>Unknown</td>
<td>Edmonton</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic GTD</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>11</td>
<td>18</td>
<td>Individual</td>
<td>Surrey</td>
<td>British Columbia</td>
<td>Assassination</td>
<td>1</td>
<td>0</td>
<td>International GTD</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>6</td>
<td>16</td>
<td>Unknown</td>
<td>Edmonton</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>2</td>
<td>Domestic GTD</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>8</td>
<td>1</td>
<td>Justice Department</td>
<td></td>
<td></td>
<td>Mailed Threat</td>
<td>0</td>
<td>0</td>
<td>International RCMP</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>No.</td>
<td>No.</td>
<td>Group/Tagline</td>
<td>Location 1</td>
<td>Location 2</td>
<td>Action Type</td>
<td>No.</td>
<td>No.</td>
<td>Group/Tagline</td>
<td>Location 1</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>-----</td>
<td>---------------</td>
<td>------------</td>
<td>------------</td>
<td>-------------</td>
<td>-----</td>
<td>-----</td>
<td>---------------</td>
<td>------------</td>
</tr>
<tr>
<td>2000</td>
<td>4</td>
<td>4</td>
<td>indeterminate ArabPalestinian guerrillas</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>ITERATE</td>
</tr>
<tr>
<td>2000</td>
<td>4</td>
<td>10</td>
<td>No Group</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>ITERATE</td>
</tr>
<tr>
<td>2000</td>
<td>5</td>
<td>18</td>
<td>Unknown</td>
<td>Quebec</td>
<td>Quebec</td>
<td>Food-tampering</td>
<td>0</td>
<td>27</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2000</td>
<td>7</td>
<td>11</td>
<td>Baby Liberation Army</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Armed Assault</td>
<td>0</td>
<td>1</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2000</td>
<td>7</td>
<td>11</td>
<td>Baby Liberation Arm</td>
<td>Vancouver</td>
<td>British Columbia</td>
<td>Assassination</td>
<td>0</td>
<td>1</td>
<td>Domestic</td>
<td>RCMP</td>
</tr>
<tr>
<td>2000</td>
<td>9</td>
<td>19</td>
<td>Unknown</td>
<td>Kelowna</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>2</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2000</td>
<td>9</td>
<td>20</td>
<td>La Brigade d'Autodefense du Francais</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>RCMP</td>
</tr>
<tr>
<td>2000</td>
<td>10</td>
<td>1</td>
<td>French Self-Defense Brigade</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>CBC</td>
</tr>
<tr>
<td>2000</td>
<td>11</td>
<td>1</td>
<td>Individual</td>
<td>Edmonton</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2000</td>
<td>11</td>
<td>1</td>
<td>Individual</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>La Presse</td>
</tr>
<tr>
<td>2001</td>
<td>4</td>
<td>18</td>
<td>Anarchists</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Armed Assault</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>RCMP</td>
</tr>
<tr>
<td>2001</td>
<td>9</td>
<td>14</td>
<td>Unknown</td>
<td>Mississauga</td>
<td>Ontario</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>RCMP</td>
</tr>
<tr>
<td>2001</td>
<td>9</td>
<td>15</td>
<td>Unknown</td>
<td>Hamilton</td>
<td>Ontario</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>The Canadian Press</td>
</tr>
<tr>
<td>2001</td>
<td>9</td>
<td>28</td>
<td>Canadian Ethnic Cleansing Team</td>
<td></td>
<td></td>
<td>Threat</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>RCMP</td>
</tr>
<tr>
<td>2003</td>
<td>5</td>
<td>5</td>
<td>Individual</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>The Globe and Mail</td>
</tr>
<tr>
<td>2004</td>
<td>4</td>
<td>5</td>
<td>Hamas (Islamic Resistance Movement)</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>GTD</td>
</tr>
<tr>
<td>2004</td>
<td>11</td>
<td>29</td>
<td>Initiative de Resistance Internationaliste</td>
<td>Unknown</td>
<td></td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2005</td>
<td>10</td>
<td>31</td>
<td>Earth Liberation Front</td>
<td>Guelph</td>
<td>Ontario</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>RAND</td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
<td>30</td>
<td>Earth Liberation Front</td>
<td>Guelph</td>
<td>Ontario</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>4</td>
<td>3</td>
<td>Individual</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Bombing</td>
<td>1</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>6</td>
<td>27</td>
<td>Earth Liberation Front</td>
<td>Guelph</td>
<td>Ontario</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>Year</td>
<td>Month</td>
<td>Day</td>
<td>Group/Coalition</td>
<td>Location</td>
<td>Province</td>
<td>Action Type</td>
<td>Incidents</td>
<td>Incidents</td>
<td>Type</td>
<td>Source</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-----</td>
<td>------------------------------------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>-------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------</td>
<td>------------</td>
</tr>
<tr>
<td>2006</td>
<td>7</td>
<td>18</td>
<td>Earth Liberation Front</td>
<td>Guelph</td>
<td>Ontario</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>RAND</td>
</tr>
<tr>
<td>2006</td>
<td>7</td>
<td>18</td>
<td>Earth Liberation Front</td>
<td>Guelph</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>CBC</td>
</tr>
<tr>
<td>2006</td>
<td>3</td>
<td>19</td>
<td>Your Dog's Group</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Arson</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>CTV News</td>
</tr>
<tr>
<td>2006</td>
<td>5</td>
<td>22</td>
<td>Unknown</td>
<td>Edmonton</td>
<td>Alberta</td>
<td>Armed Assault</td>
<td>0</td>
<td>8</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>8</td>
<td>8</td>
<td>Unknown</td>
<td>Calgary</td>
<td>Alberta</td>
<td>Armed Assault</td>
<td>0</td>
<td>1</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>8</td>
<td>8</td>
<td>Animal Liberation Front</td>
<td>Aldergrove</td>
<td>British Columbia</td>
<td>Animal Releases</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>10</td>
<td>11</td>
<td>Unknown</td>
<td>Tomslake</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>10</td>
<td>16</td>
<td>Unknown</td>
<td>Tomslake</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>10</td>
<td>31</td>
<td>Unknown</td>
<td>Tomslake</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
<td>4</td>
<td>Unknown</td>
<td>Tomslake</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
<td>10</td>
<td>Unknown</td>
<td>Edmonton</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>7</td>
<td>1</td>
<td>Unknown</td>
<td>Pouce Coupe</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2006</td>
<td>7</td>
<td>4</td>
<td>Unknown</td>
<td>Dawson Creek</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2010</td>
<td>5</td>
<td>18</td>
<td>Fighting For Freedom Coalition</td>
<td>Ottawa</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GTD</td>
</tr>
<tr>
<td>2010</td>
<td>7</td>
<td>5</td>
<td>(Initiative de) Resistance internationaliste</td>
<td>Trois-Riviere</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>RCMP</td>
</tr>
<tr>
<td>2010</td>
<td>8</td>
<td>3</td>
<td></td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Radio-Canada</td>
</tr>
<tr>
<td>2010</td>
<td>8</td>
<td>10</td>
<td>Unknown</td>
<td>Edmonton</td>
<td>Alberta</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>GT</td>
</tr>
<tr>
<td>2010</td>
<td>8</td>
<td>26</td>
<td></td>
<td>Ottawa</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>CBC</td>
</tr>
<tr>
<td>2010</td>
<td>3</td>
<td>25</td>
<td>Unknown</td>
<td>Laval</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>La Presse</td>
</tr>
<tr>
<td>2012</td>
<td>5</td>
<td>17</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>La Presse</td>
</tr>
<tr>
<td>2012</td>
<td>9</td>
<td>4</td>
<td>Individual</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Assassination</td>
<td>1</td>
<td>1</td>
<td>Domestic</td>
<td>NYTimes</td>
</tr>
<tr>
<td>2013</td>
<td>6</td>
<td>12</td>
<td>Individual</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>Montreal Gazette</td>
</tr>
<tr>
<td>2013</td>
<td>7</td>
<td>1</td>
<td>Individual</td>
<td>Victoria</td>
<td>British Columbia</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>Domestic</td>
<td>CBC</td>
</tr>
<tr>
<td>Year</td>
<td>Month</td>
<td>Day</td>
<td>Actor</td>
<td>Location</td>
<td>Type</td>
<td>Casualties</td>
<td>Associated with</td>
<td>Source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-----</td>
<td>-------</td>
<td>----------</td>
<td>------</td>
<td>------------</td>
<td>-----------------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>10</td>
<td>27</td>
<td>Individual</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>CBC</td>
</tr>
<tr>
<td>2013</td>
<td>12</td>
<td>4</td>
<td>Unknown</td>
<td>Montreal</td>
<td>Quebec</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>CBC</td>
</tr>
<tr>
<td>2013</td>
<td>4</td>
<td></td>
<td>Al Qaeda</td>
<td>Toronto</td>
<td>Ontario</td>
<td>Bombing</td>
<td>0</td>
<td>0</td>
<td>International</td>
<td>CBC</td>
</tr>
</tbody>
</table>
Chapter 4: A Model of Canada-United States Deterrence Decisions

This chapter contains the primary contribution of this thesis, an attempt to understand the motives behind Canadian anti-terrorism policies and the related spending, and to examine how these are affected by the relationship with Canada’s immediate neighbour, the United States. This is done by exploring a two country theoretical model with strategic interactions, focusing on relative spending.

Theory can help, for example, to understand the role cooperation between the two countries plays in the level of spending chosen. Most theories of deterrence conclude that cooperation is in fact needed to end the collective action problem in antiterrorism, and is financially beneficial for all parties as countries spend too much when not working together. But cooperation with the United States has appeared to have increased Canada’s deterrence spending, as we said in Chapter 3, section 3.4.3. This analysis hopes to shed some light on whether this claim that cooperation is universally (financially) beneficial has any truth in this specific relationship, along with an overall understanding of what motivates Canadian spending.

In an attempt to explain the collective action problems in fighting terrorism, Sandler and Siqueira (2006) model deterrence and pre-emption policy choices for two countries, taking into account how the policies alter foreign behaviour. Both deterrence and pre-emption are popular policies around the globe, but Canada has primarily focused on the former as their method of preventing terrorism, making it our focus. Sandler and Siqueira’s (2006) assume the countries are completely symmetric in the parameters and functions, which is not a realistic model of the Canada-United States relationship. For a Canada-United States deterrence model, determining the relative parameter values within the model matter greatly, as it is likely asymmetric, being that the United
States is a dominant partner. As well, it is likely that the Canada-United States relationship is asymmetric beyond the parameters values in the model.

When the characteristic of Canadian deterrence is examined in context with the United States, it appears to be more in line with that of pre-emption than of deterrence. This is, to our knowledge, a novel observation. In the traditional models of antiterrorism policy deterrence is a selfish policy, it hardens domestic targets and deflects attacks abroad towards more vulnerable targets, making having higher deterrence levels ideal. In comparison, pre-emption is an altruistic policy as it attempts to disable terrorists and lowers the probability of terrorism globally. This is where the characteristics between deterrence and pre-emption get cloudy, as it does not make sense for the United States to want higher Canadian security in this analogy; it would not benefit them.

The United States push for increased Canadian security is more attributed to pre-emption, even though the policies themselves look like deterrence. The geography and integration of the two countries, not well-represented in the analogy of traditional models, allows Canadian security programs to not only provide safety for people and businesses in Canada, but also for those in the United States (including Canadians living or conducting business in the United States) by preventing terrorists from coordinating attacks within Canada and crossing the border to perform attacks within the United States.

We can clarify how the geographic proximity and the economic trade relation between the two countries causes this through a similar analogy to that of the traditional models. To represent the geographic relationship, we can assume that the two countries live in the same house with the United States being the owner of the basement, and Canada occupying the main level (representing the realistic geography of the continent). For the economic integration, we can assume that the two
are close friends and have valuables on each other’s respective floors (representing the shared economic interests and massive trade volume between the two countries).

In this situation, the role of main floor security becomes important for protecting the valuables from burglaries on the main floor as well as in the basement, making main floor (Canadian) security act as pre-emption. For example, putting an alarm security sticker on the front door will deter robberies from occurring on both floors. With Canada having valuables in the basement, it is in their best interest to use this power to protect those valuables, which could be done through installing security at the stairs. Both of these security programs would also protect the American valuables. Basement security, on the other hand, does nothing for protecting the main floor as the only access to the basement is through the stairs from the main floor.\(^{19}\)

So Canadian main floor security has characteristics of pre-emption (protecting both floors), while American basement security is deflecting (protecting only the basement at the expense of the main floor) and having the traditional characteristics of deterrence. This causes Canada to increase deterrence to protect their valuables in the basement, while the Americans are forced to find a balance of basement protection and main floor deflection to protect their interests on both floors, but also benefitting from Canadian security. If Canada decided to further increase security, this would further benefit the United States, giving reason for why the United States would want to lobby for Canada to do so in reality. This ambiguity in the characteristics of deterrence and pre-emption for Canadian deterrence in this relationship makes it worthwhile to examine the scenario where both countries deter, but Canadian deterrence acts as pre-emption. We can then establish whether it alters the outcome in an otherwise symmetric model.

\(^{19}\) The analogy breaks down a bit at this point as transnational terrorism in the United States does not only occur through Canada, but it provides a better understanding of relationship than any other previous model.
Other characteristics of Sandler and Siqueira (2006) do not fit well with the case of Canada and the United States. Symmetry, in both pre-emption and deterrence, means that countries are equal in their desire and ability to stop terrorism. The way governments choose their antiterrorism policies, and the cost associated with terrorism, both at home and abroad, are identical. It also means that terrorists have no preference in who they attack. Similar to the characteristic of deterrence deflecting attacks shown throughout research, these symmetrical aspects of the model, presented mainly through the selection of parameters, likely do not represent the Canada-United States relationship accurately. We can modify Sandler and Siqueira’s (2006) model by introducing more plausible parameter restrictions in the deterrence model. These modifications can also be done before altering Canadian deterrence to act as pre-emption to test how they change the outcome compared to Sandler and Siqueira’s (2006) deflecting symmetric model, which is simulated in section 4.3.

All modifications, in chronological order within the chapter, are as follows:

1) The calculation and inclusion of plausible asymmetric cost parameters for the two countries, both at home and abroad. This shows how dissimilar costs of attacks at home and abroad can cause those with higher costs to spend more on deterrence.

2) The calculation and inclusion of there being a bias (preference) for terrorists to attack the United States over Canada. This shows how even with relative deterrence effort in their favour, the United States faces a constant higher threat and greater spending level.

3) The introduction of Canadian deterrence acting as if it were pre-emption in an otherwise symmetric model. This modification requires changes to the deterrence model’s key fundamentals. It allows us to determine if Canadian spending increases relative to when it simply deflects in symmetry.
4) The combination of plausible cost parameters and Canadian deterrence acting as pre-emption. This allows us to determine how these forces interact in a more realistic scenario.

With each of these modifications, we can learn how different types of relationships with the United States affect spending. These different relationships are dependent on whether the two have globalized economies or have independent economies (classified as autarky), and whether the two work together on fighting terrorism (e.g. they fight cooperatively or non-cooperatively). Therefore, the relationships studied are the globalized non-cooperative (Nash), globalized full-cooperation (Pareto efficient), autarky non-cooperative, and autarky fully-cooperative relationships (equilibriums). The autarky relationship shows what spending would be if the two countries were not integrated and intertwined. For the analogy, non-cooperation would be both neighbours independently installing their own security systems. Full cooperation could be a co-security system.

Solving these allow us to determine the relative differences in spending between these cooperative and economically integrative relationships, and also allow us to comprehend how they affect relative spending between Canada and the United States. One would think, however, that given the co-benefits of Canadian pre-emptive deterrence that cooperation would lead to higher Canadian spending than in non-cooperation, creating a reason for the United States to pressure Canada to increase spending not only to bring the two countries to Pareto efficiency, but to also increase safety for the United States.

In order to study the above mentioned cases, first a numerical simulation of Sandler and Siqueira’s (2006) model is undertaken, and then it is extended to introduce these modifications. A numerical model is not necessary to analyse the effects of these modifications, but it is a good tool for exploration and allows us to calculate (e.g. estimate) and include possible realistic parameters.
Using a numerical model also makes the graphical representation of the different equilibrium concepts easier to produce.

Since the model is numerical, we need to choose functional forms and parameter values. Functional forms need to be chosen that accurately represent how deterrence lowers the probability of being attacked at home and either increases or decreases it abroad (depending on whether Canadian deterrence deflects or prevents attacks in the United States), at a decreasing rate due to diminishing return. In general, the functional forms come from those previously used in the literature, including some mentioned by Sandler and Siqueira (2006). Parameters, on the other hand, represent the measurable factors in the theory (e.g. the cost of terrorism at home and abroad). Parameters are estimated by using past data and/or by using simple estimation techniques. The goal of these parameter estimations is not to represent reality without error, but to represent plausible scenarios using key moments in the data. Calibrating the model to fit reality is nearly impossible for the reasons discussed in Chapter 2 on measuring terrorism. The values help us understand the implications of certain arguments of antiterrorism policy (i.e. whether cooperation is or is not beneficial for Canada or whether there is reason to believe Canadian spending should be above the American level), and should be interpreted with care as they only represent the particular scenario within the model’s restrictions and statistical significance cannot be tested. So the numerical values are presented, but it is the relative values that are our focus.

Before beginning the theoretical model, we first provide a literature review in the next section. After the literature review, we begin by introducing the symmetric deterrence model fundamentals (e.g. choice variables, parameters, etc.), taken directly from Sandler and Siqueira (2006) and explain the key relationships (i.e. equilibrium concepts) driven by cooperation and integration
(some of which have already been discussed). These are the non-cooperative (Nash) and full-cooperative (Pareto efficient) equilibriums for both globalized and autarky economic situations.  

4.1 Literature Review of Theoretical Antiterrorism Models

Over the past decade economists have begun researching terrorism and antiterrorism policies in response to 9/11 and the War on Terror that followed. Unfortunately, little research has been done on Canada, theoretically or empirically, despite its close relationship with the United States and the War on Terror. The majority of economists studying terrorism have focused on the effect of terrorism on economic output or different sectors of the economy in developing countries and the United States using empirical methods (see Chapter 2, section 2.3). But while empirical research is vital to our understanding of how terrorism affects the economy directly, our focus is on the theoretical literature of antiterrorism policies in order to gain an understanding of what motivates antiterrorism policy and how strategic interactions between different governments and/or terrorists can affect government policy and spending choices. Knowing how terrorists choose their targets and react to different antiterrorism policies can help governments prevent future attacks. Also knowing how governments react to each other can be vital in eliminating collective action problems in antiterrorism, and in helping us understand how different international relations alter choices.

As previously mentioned, before beginning the theoretical work, we first look at the literature for theoretical models of the two antiterrorism policies focused on in this thesis: deterrence and pre-emption. Since Sandler and Siqueira’s (2006) model forms the basis of our theoretical model, we

---

20 It is also possible to solve for the Stackelberg (leader-follower) equilibrium, but after numerous initial simulations, it was found that the Stackelberg and Nash equilibrium outcomes were extremely similar in value. At times the difference is beyond the 6th decimal place. Therefore, we do not solve for the Stackelberg outcomes.
focus our attention on others in this section, and present Sandler and Siqueira’s (2006) symmetric model in section 4.2 when we go over our model’s framework.

### 4.1.1 Deterrence Approach

Deterrence policy focuses on increasing the cost of conducting terrorism within a country by hardening targets. Examples include increasing security, increasing the cost of materials (e.g. firearms, explosives, etc.) within a country, making materials difficult to acquire, and increasing the cost and probability of getting caught and/or killed. Canada and the United States have primarily focused on deterrence and increased security to prevent more terrorism, however some argue it may not be the best approach (Frey and Luechinger, 2002). Deterrence only benefits those who introduce the policy and does not directly limit terrorist organizations from existing, but may actually force them to become more intelligent in their attacks. Sandler and Enders (1993, 2004) examine how terrorists substitute away from hardened targets to less secure targets by analysing how terrorists moved from skyjackings towards hostage taking when metal detectors where introduced in airports. This knowledge helps us understand the decision making process of terrorists.

We can also look at how governments choose to allocate their budgets to protect potential targets in a more extensive framework. Papers that examine this include Bier, Oliveros, and Samuelson (2007), Farrow (2007), Lee (2007), Powell (2007), Sandler and Lapan (1988), Sandler and Siqueira (2006) and Zhuang and Bier (2010), among others. We discuss the work of Sandler and Siqueira (2006) in greater detail in section 4.2 when we present the theoretical framework for our model, which is based off of their model. For now we briefly discuss the findings from the others mentioned above.
Farrow (2007) models governments defending against multiple targets, attempting to minimize expected social costs. He looks at cases where targets are both independent and non-independent, and also assumes that the choices by the government and the attacker are independent. What is found is that the government determines the marginal expected social cost avoided, which can reduce the probability of a target being attacked, and reduce the amount of damage if attacked. Farrow concludes that for independent sites worth investing in, they should equate the marginal expected social cost avoided across all these sites. Lee (2007) uses a three period model to analyse both government and terrorist choices. Once an attack is imminent, governments invest in defensive measures for targets worth protecting, which is followed by terrorists choosing which target to attack. What is found is that when targets are independent of each other there exists over-deterrence compared to the efficient level, as governments are spending an unnecessary amount of money protecting their targets, but coordination between targets can limit this over-deterrence: a popular conclusion. Sandler and Lapan (1988) examine the case of nonstrategic terrorists who choose their target based on vulnerability. Sandler and Lapan (1988) were the first to introduce the concept that decentralized deterrence among targets causes inefficient results and overspending, and that a completely coordinated effort is optimal. They also show that in scenarios where targets share similar interests there can exist under-deterrence compared to the efficient level. This conclusion is extremely similar to that of pre-emption (which is reviewed in the following section), where a lack of cooperation among countries (or targets) causes an inefficient outcome.

4.1.2 Pre-emption Approach

Pre-emptive policy involves going after and eliminating the terrorist threat. This approach not only decreases the probability of attacks at home, but also decreases the probability of an attack for all countries by limiting terrorist resources. The best example of pre-emptive policy is the War on
Terror. The United States, along with Canada and other NATO countries, went to the Middle East to find and kill Osama Bin Laden, and other terrorists with the intention of destabilizing Al Qaeda and its connections for their involvement in 9/11.

In the literature, pre-emption policy is theoretically analysed by Arce and Sandler (2005), Enders and Sandler (2004), Rosendorff and Sandler (2004), Sandler and Arce (2003), and Sandler and Siqueira (2006), among others. In a key paper, Rosendorff and Sandler (2004) examine how pre-emptive efforts can further enrage terrorists, increasing the risk of further attacks. If the level of pre-emption is too high, which may be caused by the perception of a higher probability of future attacks than what is actually seen, or low cost of pre-emption, the terrorists’ cause can become heightened, increasing recruitment and causing aggravated attacks against those pre-empting. This is an example of over pre-emption, as external costs are ignored. Rosendorff and Sandler (2004) use the United States after 9/11 as an example of excessive pre-emption, as the external costs for themselves and for other countries are not taken into account. Similar to researchers before them, and after, they advocate that countries work together to combat terrorism, to limit over pre-emption and combine resources efficiently. The theoretical work on pre-emption by Sandler and Siqueira (2006) is presented in greater detail when we go over our modification of Canadian deterrence acting as pre-emption in section 4.6. The mathematical framework used in this thesis for deterrence acting as pre-emption is taken from the pre-emption model of Sandler and Siqueira (2006).

4.1.3 Combining Deterrence and Pre-emption

It is also possible for countries to use a combination of both policies. Bandyopadhyay and Sandler (2011) look at a combination of pre-emptive and defensive measures in a two-country two-stage game. Other combination analyses include Arce and Sandler (2005), Carceles-Poveda and Tauman (2011), Sandler and Arce (2007), and Trajtenberg (2006), however Bandyopadhyay and Sandler
provide the most extensive model on the subject yet. They find that the choice of pre-emption is heavily relied on whether a country is a high-cost defender (or having comparative advantage in pre-emption and comparative disadvantage in deterrence), as these countries will choose to spend more on pre-emption than deterrence. As pre-emption increases, countries use less deterrence as the probability of attack lowers, and the two countries move closer to the efficient level of deterrence spending, which is zero (Bandyopadhyay and Sandler, 2011). However, comparable to the pre-emption and deterrence individual cases, there still exists a non-optimal equilibrium, however. (Bandyopadhyay and Sandler, 2011).

Bandyopadhyay and Sandler (2011) argue that because the United States has such long borders to the North and South, and that they cannot directly control antiterrorism measures in Canada and Mexico, their deterrence costs are very high and causes the United States to take a pre-emptive leadership role (i.e. the United States is at a comparative disadvantage when defending due to their geographic location). We argue later that, for similar geographic reasons, the United States attempts to influence Canadian deterrence levels to limit their antiterrorism burden costs.

Now that we have a good understanding of the theoretical models seen in the literature, we can begin our theoretical analysis, which is based of Sandler and Siqueira (2006), and use some of the information and conclusions from other papers (specifically Bandyopadhyay and Sandler, 2011) to produce a more realistic theoretical model of Canadian antiterrorism policy choices.

### 4.2 Symmetric Model Fundamentals and Key Equilibrium Concepts

We first go over the fundamentals of the symmetric model, with most information being taken directly from Sandler and Siqueira (2006), to prevent the need for mathematical replication at different stages throughout the chapter.
The model has two countries (or players) with costs for a successful and unsuccessful (e.g. indirect costs associated with the fear of recurring attempts) terrorist attack on their soil, and, dependent on their relationship, have costs of a successful and unsuccessful attack in the other country (i.e. abroad). This assumption that countries have foreign costs of terrorism is not farfetched for Canada and the United States, as both countries have significant interest in each other (e.g. companies, residents, tourists, resources). These costs are represented through the parameters $H$ (cost of a successful attack at home), $A$ (cost of an unsuccessful attack at home), $h$ (cost of a successful attack abroad), and $a$ (cost of an unsuccessful attack abroad), where $H$ (and $h$) $>$ $A$ (and $a$).

The terrorists base who they attack on the probability of them succeeding. Therefore, the probability that a country is attacked (denoted as $\pi_i$) is dependent on the relative value of the probability of terrorists succeeding in either country. The lower the probability of terrorists being successful relative to the other country, the lower the probability of being attacked.

With this information, governments choose policies to lower their cost of terrorism. The model assumes that the probability of successful terrorism is directly related to the chosen government antiterrorism policies. This makes the probability of terrorist failure at home the choice variable in the model (denoted as $x_i$ ($i = US, CAN$), where $0 < x_i \leq 1$). The may appear backwards as the focus of the thesis is Canadian antiterrorism policies and the spending associated with them, and not the probability of being attacked. But going this route still allows us to analyse government spending by producing a function for it (denoted as $G(x_i)$), with the added benefit of understanding the potential risk of terrorism occurring in Canada given certain spending levels. Since the choice variable is directly related to the amount of antiterrorism policies put in place, and policies come with a cost, the government expenditure function is a function of the probability of terrorist failure, $x_i$. Conditions on the government expenditure function include that a higher probability of terrorist
failure \((x_i)\) is directly related to higher government expenditure on antiterrorism policies, \(G(x_i)' > 0\). Diminishing returns to deterrence effort mean that the second-order derivative of government expenditure with respect to the choice variable is negative.

The traditional deterrence model theorized by Sandler and Siqueira (2006) assumes that deterrence efforts in country \(i\) only have positive impacts on fighting terrorism in that country seen through \(\left(\frac{\partial \pi_i}{\partial x_i} < 0\right)\), where more antiterrorism policies, seen through a higher probability of terrorist failure \((x_i)\) decrease the probability of being attacked with diminishing returns to effort \(\left(\frac{\partial^2 \pi_i}{\partial x_i^2} > 0\right)\). Deterrence efforts in the home country \(i\) actually deflect attacks abroad \(\left(\frac{\partial \pi_i}{\partial x_j} > 0\right)\), where \(j\) is the other (foreign) country \((j = US, CAN i \neq j)\), at a decreasing rate \(\frac{\partial^2 \pi_i}{\partial x_j^2} < 0\), as terrorists have a preference of attacking the least protected country. A higher probability of failed terrorism abroad \((x_j)\) increases the probability of being attacked at home. This behaviour causes country \(i\)’s deterrence efforts to reduce the marginal impact of country \(j\)’s deterrence efforts when \(x_i > x_j\). This is mathematically shown in the cross-partial derivative \(\frac{\partial^2 \pi_j}{\partial x_i \partial x_j} \geq 0\), if \(x_i \geq x_j\). If the deterrence effort by both countries are equal, the cross partial derivatives are also equal to zero.

To solve what level of deterrence (and hence spending) governments choose, we need to net solve for the cost of terrorism for each country. The cost of terrorism is calculated using the expected cost of attacks, specifically the expected cost of an attack at home and abroad. In symmetry the expected costs will be identical for both countries, so we only show those for the United States.

This is done throughout section 4.2 for the most part. To get the equations for Canada, the subscripts need to only be changed. The expected cost of a home attack for the United States is

\[
l_{US}(x_{US}) = x_{US} \cdot A + (1 - x_{US}) \cdot H, \quad (4.2.1)
\]
(where it is a function of the probability of terrorist failure at home \( x_{US} \), the cost of a successful attack at home \( H \), and the cost of an unsuccessful attack at home \( A \)) and the expected cost of terrorism abroad is

\[
v_{US}(x_{CAN}) = x_{CAN} \cdot a + (1 - x_{CAN}) \cdot h
\]  

(4.2.2)

(where it is a function of the probability of terrorist failure abroad \( x_{CAN} \), the cost of a successful attack abroad \( h \), and the cost of an unsuccessful attack abroad \( a \)).

We can then calculate the cost of terrorism for the United States by subtracting equation (4.2.2) from (4.2.1). This gives

\[
C_{US}(x_{US}, x_{CAN}) = G(x_{US}) + \pi_{US} \cdot l_{US}(x_{US}) + \pi_{CAN} \cdot v_{US}(x_{CAN}).
\]  

(4.2.3)

This representation of the cost function for each country remains the same throughout all modifications. It is derived considering the deterrence expenditure, the expected cost of an attack at home, and the expected cost of an attack on their foreign interests. Since it is directly related to the probability of being attacked and the probability of terrorist failure, both at home and abroad, this makes a balance between the two needed to lower costs.

### 4.2.1 Globalized Nash Equilibrium

The globalized Nash equilibrium is characterized as the two countries deterring terrorism non-cooperatively when they are in a globalized economic relationship. It is a simultaneous move equilibrium. In the neighbourhood analogy, the globalized scenario represents the two having valuables on each other’s property. The Nash equilibrium can be solved for both cases when Canadian deterrence deflects attacks (having separate houses in the neighbourhood analogy) and when Canadian deterrence acts as pre-emption (living on different floors in the same house in the
neighbourhood analogy). We only solve for when Canadian deterrence deflected in this section, and we briefly go over the changes for when Canadian deterrence acts as pre-emption when it is introduced in section 4.6.1. The globalized Nash equilibrium is referred to as the Nash equilibrium in the graphs since it represents the most realistic Nash equilibrium calculated (the other Nash equilibrium being the autarky Nash equilibrium, which is referred to as autarky).

To solve for the Nash equilibrium values of $x_{US}$ and $x_{CAN}$ we can differentiate the cost function (4.2.3) with respect to $x_{US}$ and $x_{CAN}$ and set the equation to zero to find the best response of each country.\(^{21}\) For the United States we get

$$\frac{\partial C_{US}}{\partial x_{US}} = G'(x_{US}) + \pi_{US} \cdot l'_{US}(x_{US}) + l_{US}(x_{US}) \cdot \frac{\partial \pi_{US}}{\partial x_{US}} + v_{US}(x_{CAN}) \cdot \frac{\partial \pi_{CAN}}{\partial x_{US}} = 0. \quad (4.2.4)$$

Following Sandler and Siqueira (2006), we can break the best response function into parts to help better understand equation (4.2.4). First is the American best response function. $G'(x_{US})$ and $v_{US}(x_{CAN}) \cdot \frac{\partial \pi_{CAN}}{\partial x_{US}}$ represent the costs of increasing deterrence, which is seen through an increase in $x_{US}$. When $x_{US}$ increases, $G(x_{US})$ and the costs associated with deflecting attacks abroad towards its foreign interests also increases. $\pi_{US} \cdot l'_{US}(x_{US})$ and $l_{US}(x_{US}) \cdot \frac{\partial \pi_{US}}{\partial x_{US}}$ represent the benefits of increasing deterrence. The first term represents the falling expected cost of a home

\(^{21}\) The second-order condition requires

$$\frac{\partial^2 C_{US}}{\partial x_{US}^2} = G''(x_{US}) + 2 \cdot l'_{US}(x_{US}) \cdot \frac{\partial \pi_{US}}{\partial x_{US}} + l_{US}(x_{US}) \cdot \frac{\partial^2 \pi_{US}}{\partial x_{US}^2} + v(x_{US}) \cdot \frac{\partial^2 \pi_{CAN}}{\partial x_{US}^2} > 0.$$ 

The cross partial derivative (also known as first order cross derivative of the best response function) we see that it is positive. This means that the government’s deterrence efforts are strategic complements in that an increase in $x_{CAN}$, from an increase in Canada’s deterrence efforts, will increase the American best response.
attack and the second term represents the lower probability of a home attack as attacks are now deflected abroad. All four of these terms should cancel out.

We can now find the Nash Equilibrium by solving for the intersecting point of the two best response functions between 0 and 1. While a corner solution in the model is possible, realistically any country with a small amount of terrorism risk has implemented antiterrorism policies (Sandler and Siqueira, 2006).22

4.2.2 Autarky Nash Equilibrium

The autarky Nash equilibrium is defined here as the two countries having no economic or security relationship and purely focusing on deflection as a way to reduce the probability of being attacked. In the neighbourhood analogy, the two have no valuables in each other’s property and the two live in individual neighbouring houses when we discussing the traditional deterrence model, making geography and the threat of robbery the only common attributes. Having no neighbouring (foreign) costs causes the expected cost of burglary in the neighbour’s house (terrorism abroad) to equal zero, decreasing the cost functions. So, for example, the cost function for the United States is given by equation (4.2.1) plus government expenditure as equation (4.2.2) is no longer relevant. Much like the globalized Nash equilibrium, the autarky Nash equilibrium can also be solved for when Canadian deterrence acts a pre-emption. This is done when this modification is introduced in section 4.6.1. The method that the equilibriums are solved remains the same. It is only the interpretation of the equations that is different.

22 The best example is airport security, in place in all countries of the world.
Solving for the autarky level of spending is identical to the Nash equilibrium method, with now there being no foreign costs \((a=h=0)\). If Canadian deterrence deflects, we will have

\[
\frac{\partial c_{US}^{A}(x_{US}^{N},x_{CAN}^{N})}{\partial x_{US}} > 0
\]

(4.2.5)

for the United States, and also for Canada with the subscripts switched. Superscript \(A\) stands for autarky, and superscript \(N\) stands for Nash equilibrium. This conclusion seen in equation (4.2.5) represents that the autarky equilibrium will be greater in value than the Nash globalized equilibrium by inserting the Nash equilibrium values into the autarky cost function and determining it is positive.

### 4.2.3 Pareto Efficient Allocation

The Pareto efficient level is the full-cooperative level of spending. There will be a Pareto efficient level for both when the countries are globalized with foreign costs (simply known as the efficient level in graphs), and for the autarky case when countries have no foreign costs (known as the autarky efficient level). The Pareto efficient level can analogously be the two neighbours working together to build a fence around their living spaces. Solving for this allows us to know whether Canadian cooperation with the United States is as destructive to the Canadian taxpayer as some make it out to be. Like the globalized and autarky Nash equilibriums, they can also be solved for when Canadian deterrence acts as pre-emption, but we leave this for when this modification is introduced in section 4.6.1. The way the allocation is calculated remains the same.

Efficiency is often discussed in antiterrorism research as the universally desirable or needed level of deterrence to limit terrorism globally, which is where the general terms under and over-deterrence in economics of antiterrorism originates from. The efficient level does not necessarily
represent an individual country’s desirable level of deterrence spending, as efficiency is not necessarily fair.

The first step to finding the (Pareto) efficient allocation is to find the total cost function by combining each country’s respective cost function. This gives

\[ C_T = G(x_{US}) + G(x_{CAN}) + \pi_{US}(x_{US}, x_{CAN}) \cdot \left(l_{US}(x_{US}) + v_{CAN}(x_{US})\right) + \pi_{CAN}(x_{US}, x_{CAN}) \cdot \left(l_{CAN}(x_{CAN}) + v_{US}(x_{CAN})\right). \]  

Differentiation of the total cost function with respect to \( x_{US} \) and \( x_{CAN} \) and solving gives us the Pareto efficient level of deterrence for both countries. The first-order condition looks like

\[ \frac{\partial C_T}{\partial x_{US}} = G'(x_{US}) + \pi_{US} \cdot \left(l'_{US}(x_{US}) + v'_{CAN}(x_{US})\right) + \left(l_{US}(x_{US}) + v_{CAN}(x_{US})\right) \cdot \frac{\partial \pi_{US}}{\partial x_{US}} + \\
\left(l_{CAN}(x_{CAN}) + v_{US}(x_{CAN})\right) \cdot \frac{\partial \pi_{CAN}}{\partial x_{US}} = 0. \]  

For the United States. It will identical for Canada other than switched subscripts. We can evaluate the first-order derivate at the Nash Equilibrium to get

\[ \frac{\partial C_T(x_{US}^N, x_{CAN}^N)}{\partial x_{US}} = \pi_{US} \cdot v'_{CAN}(x_{US}^N) + v_{CAN}(x_{US}^N) \cdot \frac{\partial \pi_{US}}{\partial x_{US}} + l_{CAN}(x_{CAN}^N) \cdot \frac{\partial \pi_{CAN}}{\partial x_{US}} < 0. \]  

With this we can determine whether there exists over/under-deterrence compared to efficiency at the Nash equilibrium. If the equation is positive there is over-deterrence compared to the efficient

\[ \text{23} \]  

The second order derivate satisfies the sufficient requirement that the principal minor Hessian matrix must be strictly positive. That is, \( \frac{\partial^2 C_T}{\partial x_i^2} > 0 \) and \( \frac{\partial^2 C_T}{\partial x_i^2} \cdot \frac{\partial^2 C_T}{\partial x_j^2} - \left( \frac{\partial^2 C_T}{\partial x_i^2 \partial x_j^2} \right)^2 > 0 \), where \( i, j = US, CAN \) and \( i \neq j \).
cooperative equilibrium, as countries are producing deterrence efforts greater than the efficient level. If the equation is negative there is under-deterrence compared to efficiency.

The first term in equation (4.2.8) the marginal external benefit associated with the American deterrence efforts at home protecting Canada’s foreign interests. Given the form of $v_{CAN}(x_{US})$ for Canada, the first order derivate of this term ($a-h$) will be negative, since $h > a$. This represents the decrease in expected damage abroad for Canada, and it is a marginal external benefit. The second term is also a marginal external benefit from protecting Canada’s foreign interest in the United States by reducing the probability of an attack in the United States, $\pi_{US}$. This term is negative as $v_{CAN}(x_{US}^N)$ will be positive and $\frac{\partial \pi_{US}}{\partial x_{US}}$ is negative. The last term is a marginal external cost for the increase in the probability of Canada being attacked due to deterrence efforts in the United States.

Since both $l_{CAN}(x_{CAN}^N)$ and $\frac{\partial \pi_{CAN}}{\partial x_{US}}$ are positive in the deflection game this represents a cost.

Marginal external benefits result in under-deterrence as countries are relying on others to protect their foreign interests too much. Marginal external costs result in over-deterrence as countries are focusing excessively on attacks being deflected, as opposed to the increased threat of foreign costs.

In the deflection game, opposing effects are at work and it is impossible to determine whether over or under-deterrence exists at this stage. We need to introduce parameter restrictions to determine if Canada over or under-deters compared to efficiency.

### 4.2.5 Choosing Functional Forms

To simulate the Nash, Pareto, and autarky equilibriums, we need to specify functional forms for government expenditure $G(x_i)$, where $i = US, CAN$, and for the probabilities of being attacked
\( \pi_{US} \) and \( \pi_{CAN} \) for all relevant cases. To meet the requirements of \( G(x_i) \) that includes the first and second order derivate to be positive, we choose the simplest functional form \( G(x_i) = x_i^2 \).

For the probability of being attacked function in the international deflection game, the form \( \pi_i = \frac{x_j}{x_i + x_j} \) (\( i = US, CAN, j = US, CAN, i \neq j \)) is chosen directly out of Sandler and Siqueira (2006). Unless otherwise mentioned, we assume \( \pi_j = 1 - \pi_i \). The chosen form satisfies the first, second, and cross derivate requirements. A full analysis of the derivative is in Appendix A.

With these functional forms we now simulate the theoretical model. We begin with a symmetric deflection model.

### 4.3 Symmetric Deflection Model Simulation

We begin by exploring the symmetric model as a base case. Comments on the outcome of the model are limited in this section, as it is not meant to be realistic but provide a base case to compare the more realistic scenarios that follow. We ask what spending would be in different cooperative and economically integrated relationships if both countries face identical threat and cost, and when both countries’ deterrence deflects attacks. This is parallel to the No Collateral Damage (i.e. autarky) and Globalized Terror Scenario (i.e. globalized) cases examined in Sandler and Siqueira (2006). The main differences here are that it is a numerical simulation and the two cases are compared in relative terms.

To simulate the model we first need to choose parameter values for the cost of attacks at home and abroad. For the purposes of research, the costs are measured in terms of percentage of GDP (e.g. 24 This condition is necessary in order for there to exist a Nash equilibrium in Sandler and Siqueira’s (2006) deterrence model. Without it there is a significant probability of the two best response functions failing to intersect.
a parameter value of 0.01 would be 0.01\% of GDP), as per the discussion in Chapter 2 on measuring terrorism. The parameter values \( H=0.05 \) for successful attacks at home and \( h=0.01 \) for successful attacks abroad are chosen. They are chosen somewhat arbitrarily, but present plausible numerical and relative costs. The cost of unsuccessful attacks \((A,a)\) are assumed to be \(\frac{1}{4}\) of successful attacks (0.0125 and 0.0025 respectively in this case).

With this information, we solve for the four probability of terrorist failure equilibriums for the two countries, dependent on the type of economic integration and antiterrorism cooperativeness (globalized non-cooperative, globalized fully-cooperative, autarky non-cooperative, and autarky fully-cooperative). This is done for this symmetric model, as each modification done in this chapter. These relationships are graphically and numerically represented to showcase how these different relationships alter Canadian spending in a strictly symmetric model. For all graphs of Canadian-American policy decisions that follow, the Canadian axis is represented as CAN, while the American axis is represented as US. Both axes represent the probability of terrorist failure, which represents the deterrence decisions of both countries as discussed in section 4.2. A higher probability of terrorist failure represents greater deterrence effort, and hence greater spending as a percentage of GDP. In the tables that follow each graph, the equilibrium values of the probability of terrorist failure are noted for each equilibrium solved for (e.g. autarky, Nash equilibrium), along with the equilibrium spending amount in parentheses in millions of CAD (calculated by determining the amount of spending as percentage of GDP and multiplying by current GDP in CAD).
Figure 19: Canada - United States Symmetric Model (shown as the probability of terrorist failure)

Not surprisingly, both countries have a 50% probability of being attacked since they must add to 1 and the countries are identical in every way, and the best response curves are concave given the chosen probability functions. Canada and the United States also end up spending equal amounts as a percentage of GDP on deterrence policy.\textsuperscript{25}

\textbf{Table 8: Canadian Model Probability of Terrorist Failure and Spending Values – Symmetry}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|}
\hline
& \textbf{Nash Equilibrium} & \textbf{Pareto} \\
\hline
\textbf{Globalized} & 0.0736 ($10450.3992$) & 0.0443 ($3790.9942$) \\
\textbf{Autarky} & 0.0814 ($12782.8020$) & 0.0113 ($2114.1889$) \\
\hline
\end{tabular}
\end{table}

\textsuperscript{25} It should always be remembered that these numbers are solely for domestic spending, and do not take into account overseas spending. We should also be careful when comparing the model’s numbers to the post-9/11 spending calculations from Chapter 3. The model’s spending output is on a per threat basis, and is constrained in a static two-country world. It is the relative values compared to the US, efficient level, and autarky that are most important.
Table 9: United States Model Probability of Terrorist Failure and Spending Values – Symmetry

<table>
<thead>
<tr>
<th></th>
<th>United States - Spending amount in parentheses (CAD Millions)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nash Equilibrium</td>
<td>Pareto</td>
</tr>
<tr>
<td>Globalized</td>
<td>0.0736 ($89689.6901)</td>
<td>0.0443 ($3790.9942)</td>
</tr>
<tr>
<td>Autarky</td>
<td>0.0814 ($109707.3449)</td>
<td>0.0113 ($2114.1889)</td>
</tr>
</tbody>
</table>

Compared to efficiency (full-cooperation), both countries are spending an excessive amount by not cooperating. This occurs because the marginal external costs outweigh the marginal external benefits of deterring, from the cost of an attack at home heavily outweighing the cost of an attack abroad (0.05 vs. 0.01). When faced with the dilemma of increasing the expected cost at home or abroad, governments will choose to protect the one that has the greater cost. Representing a hypothetical reality, the model shows that cooperation does not increase Canadian spending, but actually decreases it by eliminating the collective action problem that plagues countries when they all try to benefit using the same action. This is true for when the economies are globalized and independent in autarky. This model offers no support for the claim that the drastic increase in spending post-9/11 is due to cooperation with the United States, but actually argues that the lack of cooperation may have led to the drastic increase, unless it is assumed Canada was spending below the efficient level before 9/11.

Compared to the non-cooperative autarky equilibrium, Canada and the United States are spending less at the globalized non-cooperative equilibrium and both of the full-cooperative equilibriums. Having no economic integration with the United States actually increases Canadian spending when not cooperating. This conclusion was expected given the mathematical explanation in section 4.2.3. The increased spending in the non-cooperative autarky equilibrium is caused by the countries no longer taking into account the marginal external costs of deterrence, and only focusing
on out-detering the other. In this case, a globalized economy is beneficial in fighting terrorism.\textsuperscript{26} However, when we compare the globalized and autarky efficient levels, it is actually in Canada’s best financial interest to fully cooperate in autarky, giving different comparative results than when in a non-cooperative relationship. These results lead us to the first result.

\textit{Result 1: In a symmetric deflection scenario, Canadian spending is always identical to the United States. When not cooperating, the two countries spend less when their economics are globalized, by taking into account marginal external benefits. Both globalization and autarky present less expensive solutions when fully cooperating at the efficient equilibrium, but full-cooperation in autarky is less strenuous than in a globalized world. The least expensive outcome within a certain economic integration (e.g. autarky vs. globalization) is dependent on the amount of deterrence cooperation (fully-cooperative vs. non-cooperative).}

So in a symmetric case, we can observe that it is beneficial to cooperate, and it is actually better for Canada to be economically independent when cooperating. This is ignoring the economic benefits of globalization vs. autarky, however. When these benefits of globalization are considered, the fully-cooperative globalized scenario would likely be the ideal situation economically.

This model presents an introduction to how motives interact and how different relationships alter spending, but the symmetric cost parameters do not accurately depict a realistic scenario (ignoring the deterrence/pre-emption ambiguity for now). Holding cooperation constant, most Canadians would argue that this model’s conclusion of Canadian and American spending being equalized is unjust given what they believe to be solely an American terrorism problem, and not a Canadian problem. If the cost of terrorism in Canada is minimal we would expect the model to replicate this

\textsuperscript{26} Sandler and Siqueira (2006) point out that globalization is partially to blame for transnational terrorism, as mobility and getting needed resources is easier.
belief of Canadian spending being lower. To evaluate whether this is true within the model, we can relax the assumption of identical costs of terrorism, which could alter the chosen deterrence level for the countries. This is done in the next section.

### 4.4 Introducing Asymmetry into the Cost Parameters

To begin extending Sandler and Siqueira’s (2006) model to better replicate the relationship between Canada and the United States we first introduce more plausible cost of terrorism parameter values. Whereas before $A, H, a, h$ were used for the cost parameters for both countries, we can now use $A, H, a, h$ for the United States and $K, F, k, f$ for Canada. This means that the cost of successful and unsuccessful terrorism at home and abroad for each of the countries are now different. The expected cost functions for Canada is then

$$l_{CAN}(x_{CAN}) = x_{CAN} \cdot K + (1 - x_{CAN}) \cdot F \quad (4.4.1)$$

for an attack at home (where it is a function of the probability of terrorist failure at home $x_{CAN}$, the cost of a successful attack at home $F$, and the cost of an unsuccessful attack at home $K$) and

$$v_{CAN}(x_{US}) = x_{US} \cdot k + (1 - x_{US}) \cdot f \quad (4.4.2)$$

for an attack abroad (where it is a function of probability of terrorist failure abroad $x_1$, the cost of a successful attack abroad $f$, and the cost of an unsuccessful attack abroad $k$) . The American functions will be identical to equations (4.2.1) and (4.2.2). The rest of the model follows the same steps illustrated in the last section.

Before we simulate the theoretical model, we first need to estimate the cost parameters. This is done in the next section.
4.4.1 Estimating the Cost of Terrorism

There are a number of issues that make it particularly difficult to estimate the cost of a theoretical attack. As mentioned in Chapter 2, there are multiple different types of attacks that could occur, all with different costs. Hijackings and bombings have become a popular method of terrorism over the past four decades, however, technological advancements and easy access, the threat of chemical, biological, radiological, and nuclear (CBRN) terrorism has become an increasing focal point for governments (Enders and Olsen, 2011; Silver, 2013). While there has been theoretical simulations in the United States for possible attacks, unfortunately little to no simulations have been done for Canada, making the comparison of costs for the United States and Canada using past studies not possible. Therefore, we move forward with a simpler method of estimating the cost of an attack in both countries. While the method does have obvious flaws which we will discuss after its introduction, it is a plausible measurement without an extensive evaluation of different attack types, which itself could be its own paper.27

A simple alternative method is to use the population density of highly targeted cities and estimating the cost of a certain sized attack as a percentage of GDP. Transnational terrorists have shown preference for attacking New York City (NYC) and Toronto in the past, making these cities ideal for this study. With regard to the size of the attack, we take an even rounded number and use a $100 billion attack, which is reasonable given the estimates by the United States Government Accountability Office estimates of a CBRN attack (USGAO, 2008) and the 9/11 estimates that range from $90 billion (Navarro and Spencer, 2002) to $123 billion estimated by the CREATE Homeland Research Center in 2011 (results recalculated in 2013 CAD). These numbers should be

---

27 This should be a focal point of future Canadian terrorism research.
taken as nothing more than a lower bound estimate, however, as they do not include the indirect social costs of an attack (e.g. impact on individuals and business decision making).

By using the population density method, which is roughly 2.6:1 in favour of NYC, an attack in NYC that costs $100 billion to the American economy would cost the Canadian economy $39 billion if it happened in Toronto. As a percentage of GDP, this is a 0.0638 for the United States \( (H) \) and 0.0214 for Canada \( (F) \).

To calculate the cost of an attack abroad we examine the amount of economic dependency between the countries. The simplest way is to use imports from the foreign country as a percentage of GDP, multiply it by the gross economic loss of an attack abroad for the foreign country, and multiply that by the home country’s GDP. The Canadian economy received approximately 20\% of its imports from the United States in 2001; making the calculations: \( 0.2 \cdot \$100 \text{ billion} \cdot \text{Canadian GDP} \). The American economy received approximately 2\% of its imports from Canada, making it less dependent on the Canadian economy.\(^{28}\) This translates into a loss for Canada \( (f) \) of 0.0110 and a loss for the United States \( (h) \) of 0.0001. It makes the cost of a foreign attack greater for Canada, opposite to that seen for home attacks. Identically to the symmetric model, we set the cost of failed attack to \( \frac{1}{4} \) of the successful attacks.

Like any method, this procedure has drawbacks. There are questions surrounding whether there exists constant effort at the marginal level of the cost of an attack. An argument could be made that there actually exists diminishing efforts by government, where an attack causing $200 billion in damage would have almost an identical response to an attack causing $100 billion in damage.

\(^{28}\) While the location of the attack is important on its effect on the foreign country, this gives us a good estimate. For example, an attack on the American side of the Windsor-Detroit border would most likely have a greater negative effect on the Canadian economy than a biological attack in an American mall similar to the Dark Winter simulation.
It is also implicitly assumed that population density is a good measure of economic activity, which it may not be. Given the relative economic importance of the two cities on a global stage, we argue it is a good start. As well, the population density is based on the entire metropolitan area, and not specifically downtown. There are most likely locations in both cities where the population density is bigger, and depending on the location and the time of the attack, the economic costs could be greater than our estimates. But the fact that we observe an American attack cause greater costs at home than a Canadian attack, and a foreign attack causing more damage for Canada due to New York having a more densely populated area is what is most important.

4.4.2 Parameter Asymmetry Simulation

Using these parameter values of $H=0.0638$, $A=0.0160$ (successful and unsuccessful home attacks for the US), $h=0.0001$, $a=0.000025$ (successful and unsuccessful foreign attack for US), $F=0.0214$, $K=0.0055$ (successful and unsuccessful home attack for CAN), $f=0.0110$ and $k=0.0028$ (successful and unsuccessful US attack for CAN) the model gives the results illustrated below. Without surprise, the American probability of a terrorist failure ($x_{US}$) is greater than Canada’s ($x_{CAN}$), caused by the United States spending more money relative to Canada. What is a surprise is that the efficient level of deterrence is zero.$^{29}$

Compared to the United States, Canada is spending less in a non-cooperative equilibrium relationship. In non-cooperation, the cost abroad for a successful attack is relatively minimal for the United States, causing the benefits of deflecting attacks to outweigh the external costs.

---

$^{29}$ Mathematically this causes the probability of being attacked functions to be non-existent, but realistically this would represent a 50/50 split in probabilities.
Figure 20: Cost Parameter Asymmetry Graph

Table 10: Canadian Model Values – Parameter Asymmetry

<table>
<thead>
<tr>
<th></th>
<th>Nash Equilibrium</th>
<th></th>
<th>Pareto</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Globalized</td>
<td>0.0362</td>
<td>($2528.1008)</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>Autarky</td>
<td>0.0516</td>
<td>($5136.6108)</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Table 11: United States Model Values – Parameter Asymmetry

<table>
<thead>
<tr>
<th></th>
<th>Nash Equilibrium</th>
<th></th>
<th>Pareto</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Globalized</td>
<td>0.0832</td>
<td>($114612.9121)</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>Autarky</td>
<td>0.0879</td>
<td>($127927.7157)</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
Therefore, it is in the best interest of the United States to increase their deterrence compared to the symmetric case. For Canada, the cost of an attack at home is also larger than an attack abroad, however they are closer in value. So Canada also focuses on deflecting attacks abroad, but it is not at the same magnitude as the United States, as they are worried about its negative impact on their foreign interests.

This provides an argument that Canadian antiterrorism spending should be lower than the American level if the estimated parameters accurately depicted reality. This is more in line with the thought that Canadian spending should not be as high as the American level. The relatively small level of spending for Canada is not from terrorism being an American problem, however, but from terrorism being potentially more damaging for both countries if it happens in the United States. This is driven by the United States having a relatively large economy that Canada is dependent on.

In the efficient outcome both countries are not deterring at all, providing an unrealistic outcome and providing no benefits to being globalized or independent when cooperating. This unrealistic outcome may be arising due to a number of possibilities. For example, it may be driven by (1) the asymmetric costs, and/or (2) the deflection model requiring the probabilities of a terrorist attack in both countries to sum to 1. This should be more carefully explored in future work. The Pareto path (not shown in the graph) moves from the Nash equilibrium south towards the origin, making every Pareto improvement having higher American spending than Canada. This highlights the effect of a deterrence race to the bottom.

Unfortunately for those wishing for zero level deterrence, this is not a realistic outcome. The United States would never agree to a zero level of security, whether this is rational or not, making the model’s outcome impossible even it does represent reality. In the section 4.3 we briefly
discussed how it may be possible for Canada to have been below the efficient level pre-9/11, and in post-9/11 cooperation of any kind required an increase in deterrence spending, even with cooperation being less costly than non-cooperation. Here this cannot be the case.

Comparing the globalized non-cooperative scenario to the autarky non-cooperative scenario, Canada spends less. Even more so than the United States. The United States has little cost associated with foreign attacks, which makes their best response function hardly change. Canada, on the other hand, has a significant cost of foreign attacks. When this cost goes to zero, Canadian deterrence effort increases as they no longer need to worry about the cost of deflecting attacks abroad.

The different levels of cooperative and economically integrative relationships follow similar overall trends seen in the symmetric scenario. Cooperation is always financially beneficial and when not cooperating, autarky presents higher spending compared to globalization. This scenario is summarized as the following.

**Result 2: In a scenario where the cost of a home attack is higher for the United States and the cost of a foreign attack is higher for Canada, Canadian non-cooperative equilibrium spending is below that of the United States, above both the zero level efficient levels spending, and below the non-cooperative autarky level. Canada and the United States should focus on integrating their economies and working together to fight terrorism. Even if the fully-cooperative efficient level is unrealistic, the outcomes along the path towards it can be realistic.**

This modification is a good start in understanding how asymmetries can alter choices, but the model assumes that the asymmetric choices made by the two countries is completely based on the relative value of cost. In reality this may not be true. Even though it is likely true that the two countries have asymmetric costs, this may not be the reason for the final asymmetry in their
respective outcomes. There is the issue of whether the marginal cost of an attack is that important (e.g. is there a big change in response from $100 million compared to $150 million?), and whether the fact that the attack of large magnitude occurred at all causes a response to fix security and intelligence holes. Alternatively, we can look at cases where the costs are symmetric and focus on how other asymmetries shape the outcome of the model. We can do this by altering the model to change the probability of being attacked functions to include a possible historical preference terrorists have of attacking the United States over Canada. The new asymmetry can help shed light on the thought that terrorism is an American problem, and not a Canadian issue, and will help us understand how a preference for attacking the United States alters spending.

### 4.5 Terrorist Bias

To introduce the possible bias (preference) terrorist have of attacking the United States over Canada we introduce a new parameter $z$. Assigning a value and including this parameter in the model helps us assess the impact of the claim that terrorism is an American problem and not a Canadian one.

This form of bias is introduced by Bandyopadhyay and Sandler (2011), who use it in their two-stage deterrence and pre-emption model, and provides a simple way to include preference. While terrorists have still shown interest in attacking Canadian interests with a number of threats, including the 2013 VIA Rail conspiracy, the number is arguably minuscule in comparison to that of the United States. In the neighbourhood analogy, the bias would represent the burglars having a personal vendetta against one of the neighbours. This preference can be represented in the probability function of the United States as

$$\pi_{US} = z + (1 - z) \cdot \frac{x_{CAN}}{x_{US} + x_{CAN}}. \quad (4.5.1)$$
The Canadian probability of being attacked function remains unchanged as $\pi_{CAN} = 1 - \pi_{US}$. The probability function for the United States cannot be any lower than $z$ now. If deterrence effort is in favour of Canada so that $\frac{x_{CAN}}{x_{US} + x_{CAN}} > 0$, the probability of being attacked will increase contingent on the remaining probability $(1 - z)$ since $\pi_{US}$ and $\pi_{CAN}$ cannot be greater than 1 (or below 0). We first estimate $z$, followed by simulating the model with it included.

**4.5.1 Quantifying Terrorist Bias**

When finding a value for the parameter $z$, one approach is look at the past to calculate the amount of transnational attacks that have been directed to the United States and Canada. For this we can draw from Sandler and Enders (2006), who show that in the decade before their 2006 publication approximately 40% of all terrorist attacks were targeted towards the United States, with the majority taking place outside of United States borders. For their analysis they use the ITERATE database, which is appropriate given that it takes into account only international events. While this database has issues surrounding missing Canadian data, it is safe to assume that this issue also occurs for the United States.\textsuperscript{30,31} We also use the ITERATE database to determine the amount of transnational attacks towards the United States and Canada by gathering data on the nationality of the first victim. We gather data for different time periods before 9/11 (e.g. 1968-2001, 1980-2001) and in all cases the percentage of attacks towards the United States accounts for around 97% of all attacks towards both countries.\textsuperscript{32} While this provides a plausible number, it is impossible to know actual terrorism organisation bias towards the United States over Canada (i.e. their personal bias

\textsuperscript{30} It is possible that given that the database was created in the United States that it is biased in gathering American data compared to other countries, including Canada.

\textsuperscript{31} Sandler and Enders (2006) use a similar definition to the one used in the paper by Sandler and Siqueira (2006).

\textsuperscript{32} This also holds for events up to 2012. No incidents were towards both the United States and Canada, and unsuccessful attempts are not included.
outside of what actually occurs). Using this percentage we can solve for the bias parameter of attacking the United States, which ends up being 0.94 (proof in Appendix B). As with all parameter estimations, they are not meant to be 100% accurate, but introduce ways for them to be measured. This specific estimation is based on historical data, which is not ideal given the dynamic nature of terrorist preference, but is the simplest way to produce a value.

**4.5.2 Terrorist Bias Simulation**

Plugging in $z = 0.94$ into the symmetric model (where $H=0.05$, $A=0.0125$ (successful and unsuccessful home attack for US), $h=0.01$, $a=0.0025$ (successful and unsuccessful foreign attack for US), $F=0.05$, $K=0.0125$ (successful and unsuccessful home attack for CAN), $f=0.01$ and $k=0.0025$ (successful and unsuccessful foreign attack for CAN)) gives us the following results.

Other than the Pareto efficient points now being non-zero, at first glance figure 21 may appear similar to that in section 4.4.2. At the non-cooperative equilibrium Canada is deterring less than the United States, providing a theoretical argument that Canada should not be spending as much on antiterrorism policy if it is an American problem. However, numerically both countries are deterring less compared to the symmetric and parameter asymmetric scenarios, but compared to the parameter asymmetric scenario, Canada is spending relatively more than the United States. For example, in symmetry Canada’s probability of terrorist failure in the globalized Nash equilibrium is 0.0736, in the cost asymmetry case it is 0.0362 and here it is 0.0171. The United States’ probability of terrorist failure in the cost asymmetry case is 0.0832 and here it is 0.0279. This is why a numerical simulation is helpful in this theoretical analysis. It provides an argument that that cost asymmetry creates a greater discrepancy in relative spending than terrorist preference. The

---

33 It is also possible that terrorists get greater satisfaction from attacking one country over another, but this is impossible to take into account.
argument of “it is an American problem” has less of a negative impact on Canadian deterrence than the plausible parameter asymmetries examined.

Figure 21: Terrorist Bias Parameter Graph (shown as the probability of terrorist failure)

Table 12: Canadian Model Probability of Terrorist Failure and Spending Values – Terrorist Bias

<table>
<thead>
<tr>
<th></th>
<th>CANADA - Spending amount in parentheses (CAD Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nash Equilibrium</td>
</tr>
<tr>
<td>Globalized</td>
<td>0.0171</td>
</tr>
<tr>
<td>Autarky</td>
<td>0.0191</td>
</tr>
</tbody>
</table>

Table 13: United States Model Probability of Terrorist Failure and Spending Values - Terrorist Bias

<table>
<thead>
<tr>
<th></th>
<th>UNITED STATES - Spending amount in parentheses (CAD Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nash Equilibrium</td>
</tr>
<tr>
<td>Globalized</td>
<td>0.0279</td>
</tr>
<tr>
<td>Autarky</td>
<td>0.0298</td>
</tr>
</tbody>
</table>
The reason for the overall decrease in deterrence compared to the parameter asymmetry model is that the United States no longer needs to increase deterrence for deflecting attacks and for protecting home, but now just for protection at home. This is caused by the United States having a 0.94 minimum probability of being attacked. While this minimum probability decreases overall deterrence by preventing the need to deflect at the same magnitude without the bias, it forces the United States to spend more on deterrence than Canada. Canada also lowers its deterrence effort in a similar fashion as the need to deflect attacks lowers. However, Canadian spending lowers more than American spending because the probability of being attacked and, therefore, the expected cost of terrorism is so low at home for Canada. This provides an argument that Canada should be spending less than the United States if this type of terrorist preference were completely realistic, holding all else constant.

When the focus turns to cooperation, both countries unsurprisingly spend less at the efficient equilibriums than in non-cooperative equilibriums, but now the efficient levels are above zero unlike the cost parameter asymmetric model. And at the cooperative equilibrium we see the United States spending far more than Canada. In the neighbourhood analogy, we can think of cooperation as being the two neighbours (countries) working together to build a fence around both their properties instead of building individual fences. Building one large fence eliminates the need for a fence between the two properties. But there is still a question of who pays the majority of the bill. Since the United States is at a higher risk of being attacked, they have a higher willingness to pay for the fence and end up paying more. This is what is happening in the model. The United States has a higher probability of being attacked, so they pay more to eliminate the collective action problem. Efficiency is, therefore, more beneficial for Canada than the United States.
Non-cooperative autarky again presents higher levels of spending from ignoring the marginal external costs. In the neighbourhood analogy, this is when they no longer have valuables in each other’s houses, and they install as much security as possible to deflect burglaries to the other house. They simply do not care about each other. Burglars have a preference of attacking the American house though. The Canadian household knows that they have a low probability of being robbed, so they lower security compared to symmetry. The American household must increase security.

When we compare the cooperative levels in autarky and globalization, it is better to be in autarky, similar to the symmetric model. But like the symmetric model, we need to remember that we are ignoring the economic benefits of globalization, solely focusing on the cost of deterrence. This scenario can be summarized in the following result.

**Result 3:** In the scenario where there is a preference for terrorists to attack the United States over Canada, Canada deters and spends less than the United States in all relationships. Autarky increases spending when not cooperating, similar to previous scenarios, but the United States still needs to spend more to fight the preference terrorists have of attacking them. At efficiency, both countries spend less, but the United States is still spending more than Canada, and autarky is cheaper for both countries when cooperating. The lowest cost outcome within a certain economic integration is dependent on the amount of cooperation the two countries have when deciding their level of deterrence, similar to symmetry. Nonetheless, in this scenario Canada should always be spending less than the United States.

With Canada benefiting more than the United State when cooperating, we would expect Canada to push for cooperation. But, generally it is the United States that recommends greater cooperation (see Chapter 3, section 3.4.2), with Canada being reluctant at times to do so. This is where Canadian deterrence acting as pre-emption adds explanatory power, as this new type of model
takes into account the United States benefiting from Canadian effort, and hence cooperation should benefit the United States more than Canada. This is more in line with reality.

4.6 Canadian Deterrence acting as Pre-emption

To fully take into account the geographical, economic, and security relationship the two countries have, we can modify Sandler and Siqueira’s (2006) model so that Canadian spending acts as pre-emption and not deterrence. By changing the model so that Canadian efforts indirectly assists the fight against terrorism in the United States by attempting to protect their foreign interests and prevent terrorists from entering the United States through Canada we should witness external marginal costs from Canadian deterrence become almost zero. This should provide a better understanding of how the Canadian motives for fighting terrorism are beyond domestic public safety and deflection of attacks. This should also allow the sum of the probabilities of being attacked to be less than 1 and allows there to be a probability of no attack at all, a realistic goal for any country.

4.6.1 Altering Sandler and Siqueira’s (2006) Deterrence Model Fundamentals and Assumptions for Canadian Deterrence acting as Pre-emption

Before simulating the model of Canadian deterrence acting as pre-emption, we need to modify the deterrence model’s fundamentals by combining those presented in section 4.2 with the pre-emption model’s fundamentals presented by Sandler and Siqueira (2006). The key difference between the two policies is how the introduction or increase in antiterrorism policies in one country increases or decreases the probability of terrorism occurring in the other country. To mathematically distinguish the two policies Sandler and Siqueira (2006) present the differing characteristics of the
two policies directly within the probability of being attacked functions, and we use the same method.

Unlike deterrence, pre-emption decreases the probability of terrorism in the other country, thus we need to make the first-order derivate of the American probability of being attacked with respect to Canadian deterrence negative \( \frac{\partial \pi_{US}}{\partial x_{CAN}} < 0 \). In order to present a negative first order cross-partial derivative, we need to modify the probability of being attacked function for the United States since it is their probability that is now negatively affected from Canadian efforts. Since the effect of American deterrence remains the same with this modification (i.e. we still get \( \frac{\partial \pi_{CAN}}{\partial x_{US}} > 0 \)), the characteristics of the Canadian probability function will remained unchanged. In order to modify the American probability function we need to make the numerator of the probability function a fixed value and ensure that it is above zero, as opposed to it being variable in value and above zero in the traditions deterrence model where \( \pi_i = \frac{x_j}{x_i+x_j} \) \( (i = US, CAN, j = US, CAN, i \neq j, \text{where } 0 \leq x_i, x_j \leq 1) \).

In order to modify the model to fit Canadian deterrence acting as pre-emption, a new set of parameters must be introduced (similarly done to Sandler and Siqueira, 2006). These are also introduced in relative terms, similarly to that done for \( x_{US} \) and \( x_{CAN} \) as a higher value in one country increases the probability of terrorism in the other country. These new parameters, denoted as \( \Phi_{US} \) for the United States and \( \Phi_{CAN} \) for Canada, represent an obstacle that protects the home country but increases the probability of being attacked for the foreign country. An obstacle can be a geographic situation where limited access for terrorists and weapons is possible (e.g. lacking an oceanic port, mountains interfering with high-jacking opportunities, or trains not passing through highly populated areas). These are obstacles not directed related to antiterrorism effort, and cannot
be changed in the short-run. Mathematically, since the obstacle parameters are numerically chosen they give a fixed (or minimum when combined with the choice variables) value to the numerator of the probability of being attacked function, forcing the first order derivate to always be negative. We can see this in the following functions.

Given the above mentioned changes the probability of being attacked for the United States becomes

\[ \pi_{US} = \frac{\emptyset_{CAN}}{x_{US} + x_{CAN} + \emptyset_{US} + \emptyset_{CAN}} \text{ where } (\emptyset_{CAN} > 0). \]  

(4.6.1)

The probability of there being an attack in the United States is now dependent on the relative values of the obstacle parameters and the probability of terrorist failure in both countries in the denominator. The American probability of terrorist failure is not included in the numerator for the mathematical requirement that it be fixed and above zero, and because Canada’s deterrence and spending choices are no longer increasing the probability of being attacked in the United States (i.e. the symmetric model’s American probability equation of \( \pi_{US} = \frac{x_{CAN}}{x_{US} + x_{CAN}} \) is no longer useful here as the United States is no longer choosing deterrence policy based on the relative deterrence between the two countries, but on the combined deterrence level, as Canadian deterrence is beneficial for the United States). The probability of being attacked for Canada will be

\[ \pi_{CAN} = \frac{x_{US} + \emptyset_{US}}{x_{US} + x_{CAN} + \emptyset_{US} + \emptyset_{CAN}}. \]  

(4.6.2)

Since the probability of being attacked in Canada is still negatively impacted by the level of American deterrence, the relative probability of terrorist failure (directly affected by the amount of deterrence policy) is still a factor. Canada still needs to take into account how American deterrence negatively impacts the Canadian fight against terrorism at home.
Both of these functions (4.6.1) and (4.6.2) satisfy the requirements for Canadian deterrence acting as pre-emption of \( \frac{\partial \pi_{US}}{\partial x_{CAN}} < 0 \) (where Canadian deterrence negatively impacts the probability of there being an attack in the United States), \( \frac{\partial \pi_{CAN}}{\partial x_{US}} > 0 \) (where American deterrence increases the probability of there being an attack in Canada by defecting attacks), \( \frac{\partial \pi_{CAN}}{\partial x_{CAN}} < 0 \) (where Canadian deterrence negatively impacts the probability of their being an attack in Canada), and \( \frac{\partial \pi_{US}}{\partial x_{US}} < 0 \) (where American deterrence negatively impacts the probability of there being an attack in the United States). The functions (4.6.1) and (4.6.2) also satisfy the second-order derivative requirements from section 4.2 of diminishing returns to deterrence effort.

Because the first order derivative of both functions with respect to \( x_{CAN} \) are negative, the combination of Canada’s and the United States’ probabilities can be less than 1, opening up the possibility of there being no attack at all. The model is no longer constrained to \( \pi_j = 1 - \pi_i \), where \( i=j=US, CAN \) and \( i \) does not equal \( j \).

We next go over how Canadian deterrence acting as pre-emption changes the equilibrium concepts from sections 4.2.1, 4.2.2, and 4.2.3.

For the globalized Nash equilibrium (section 4.2.1) the first derivative of Canada’s cost function is similar to that of the United States seen in equation (4.2.4). Canada’s cost function derived with respect to their choice variable (probability of terrorist failure in Canada) is

\[
\frac{\partial C_{CAN}}{\partial x_{CAN}} = G'(x_{CAN}) + \pi_{CAN} \cdot l'_{CAN}(x_{CAN}) + l_{CAN}(x_{CAN}) \cdot \frac{\partial \pi_{CAN}}{\partial x_{CAN}} + v_{CAN}(x_{US}) \cdot \frac{\partial \pi_{US}}{\partial x_{CAN}} = 0, \quad (4.6.3).
\]

However, compared to the equation (4.2.4) for American symmetric deflection equation, the fourth term, \( v_{CAN}(x_{US}) \cdot \frac{\partial \pi_{US}}{\partial x_{CAN}} \), will now be considered a benefit when Canadian deterrence act as pre-
emption. As previously mentioned and explained, $\frac{\partial \pi_{US}}{\partial x_{CAN}}$ is negative due to Canadian deterrence now lowering the probability of being attacked in the United States. This leaves only the cost of increasing Canadian deterrence (when it acts as pre-emption) as the government expenditure level, which must increase at the margin in order for the terms to cancel out. Therefore, the model implies that Canadian expenditure on deterrence must shift upwards. The interpretation of the first derivative of the American cost function with respect to the American choice variable (equation 4.2.4) remains the same.

For the Autarky Nash equilibrium we see that the value of Canadian deterrence and spending is smaller than in a globalized Nash equilibrium (now we have $\frac{\partial C_{CAN}^{A}(x_{US}^{N},x_{CAN}^{N})}{\partial x_{CAN}} < 0$ for Canada instead of $\frac{\partial C_{CAN}^{A}(x_{US}^{N},x_{CAN}^{N})}{\partial x_{CAN}} > 0$, which is seen in the traditional deterrence model, where superscript $A$ stands for autarky, and superscript $N$ stands for Nash equilibrium). The comparison of Canada’s autarky and globalized Nash equilibrium values for the traditional deterrence model is not shown in section 4.2, but is represented through the American equation (4.2.5), since the model presented in section 4.2 is completely symmetric. Solving for whether deterrence in autarky is greater or smaller than when globalized is calculated by inserting the globalized Nash equilibrium values ($x_{US}^{N}$ and $x_{CAN}^{N}$) into the first derivative of the autarky cost function with respect to the home country’s choice variable and determining whether it is positive or negative. When this is done, it presents results concluding that Canada would be spending less in autarky (e.g. deflecting attacks with no foreign costs), than when globalized with the United States. Similarly to when we discussed the changes to the globalized Nash equilibrium, since American deterrence still deflects attacks to Canada, equation (4.2.5) still holds for the United States.
For the Pareto efficient allocation we can look at differences Canadian deterrence acting as pre-emption creates by examining the first derivate of the combined total cost function of both countries ($C_T$) with respect to Canada’s choice variable ($x_{CAN}$). This is was symmetrically done for both countries, but only mathematically represented for the United States, in equation (4.2.8).

When Canadian deterrence acts as pre-emption, all the terms in equation (4.2.8) are marginal external benefits for the United States, meaning the non-cooperative Nash relationship will lead to less deterrence for the United States than the efficient level in symmetry. For Canada on the other hand, the first-order derivative of the total cost function with respect to their choice variable

$$\frac{\partial C_T(x^N_{US}, x^N_{CAN})}{\partial x_{CAN}} = \pi_{CAN} \cdot v'_{US}(x^N_{CAN}) + v_{US}(x^N_{CAN}) \cdot \frac{\partial \pi_{CAN}}{\partial x_{CAN}} + l_{US}(x^N_{US}) \cdot \frac{\partial \pi_{US}}{\partial x_{CAN}} < 0$$  (4.6.4)

remains unknown, as the last term $l_{US}(x^N_{US}) \cdot \frac{\partial \pi_{US}}{\partial x_{CAN}}$ is still a marginal external cost. We need to introduce parameter restrictions to determine if Canada over or under-deters compared to efficiency.

Now that we have introduced new probability functions and have gone over the modifications to the equilibrium concepts, we can now simulate a symmetric model of Canadian deterrence acting as pre-emption in the next section.

**4.6.1 Simulating Canadian Deterrence acting as Pre-emption in Symmetry**

With Canadian deterrence acting as pre-emption, we need to choose identical values of the obstacle parameters $\phi_{US}$ and $\phi_{CAN}$ (introduced in section 4.6.1) to find out how Canadian deterrence behaving as pre-emption transforms the model. Simply for symmetry, we choose obstacle parameter values of 0.2. There are no restrictions on what the obstacle parameter can be other than the Canadian parameter needing to be greater than zero. The American obstacle parameters can be
zero. This is a technical assumption to ensure a solution exists. Failure of this will cause the American probability of a terrorist attack to have a zero numerator and create non-existence. We also introduce the obstacle parameter into the symmetric deflection model to get a true understanding of how the new functional form of American deterrence shifts the outcome, not the obstacle parameters.

Using 0.2 for the obstacle parameters and using the same symmetric cost parameters of $H=0.05, A=0.0125$ (successful and unsuccessful home attack for US), $h=0.01, a=0.0025$ (successful and unsuccessful foreign attack for US), $F=0.05, K=0.0125$ (successful and unsuccessful home attack for CAN), $f=0.01$ and $k=0.0025$ (successful and unsuccessful foreign attack for CAN) we get the following results. The best response functions are now more linear, directly caused from the inclusion of the obstacle parameters as the derivative are now smaller in absolute value. The obstacle parameters also cause both countries to have an intercept above zero in figure 22.

When Canadian antiterrorism spending acts as pre-emption rather than deterrence, Canada’s best response function shifts up from having a large cost associated with foreign terrorism. Increasing Canadian spending protects Canada’s foreign interests in the United States. The United States does not have a shift in the best response function, but rather a rotation towards the Canadian axes and a change from concavity to convexity. This is caused by the external marginal effort of Canadian deterrence outweighing the need for increased American effort at the margin, at a decreasing rate. For example, for each increase in Canadian deterrence, the United States can lower their deterrence effort to get the same probability of terrorist failure because Canadian deterrence is beneficial for them. The United States does still deter, though, as the Canadian effort is not substantial enough to make the American effort unnecessary. Outcomes aside, the model appears to be the best fit in explaining the relationship between Canada and the United States.
Figure 22: Canadian Deterrence acting as Pre-emption (symmetric case, shown as the probability of terrorist failure)

Table 14: Canadian Model Probability of Terrorist Failure and Spending Values - Canadian Deterrence as Pre-emption

<table>
<thead>
<tr>
<th></th>
<th>Nash Equilibrium</th>
<th>Pareto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globalized</td>
<td>0.0390 ($2934.3132)</td>
<td>0.0641 ($7920.7816)</td>
</tr>
<tr>
<td>Autarky</td>
<td>0.0352 ($2390.3560)</td>
<td>0.0094 ($170.4641)</td>
</tr>
</tbody>
</table>

Table 15: United States Model Probability of Terrorist Failure and Spending Values - Canadian Deterrence as Pre-emption

<table>
<thead>
<tr>
<th></th>
<th>Nash Equilibrium</th>
<th>Pareto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globalized</td>
<td>0.0254 ($10682.0432)</td>
<td>0.0000 ($0.0000)</td>
</tr>
<tr>
<td>Autarky</td>
<td>0.0352 ($20515.0331)</td>
<td>0.0094 ($1462.9942)</td>
</tr>
</tbody>
</table>
In the non-cooperative globalized equilibrium, Canada spends more on deterrence efforts relative to the United States when it behaves as pre-emption, seen through a higher probability of terrorist failure, $x_{\text{CAN}}$. The relative increase in Canadian deterrence and spending is due to the need to balance the first order derivative of Canada’s cost function. This is due to Canadian efforts now becoming an external benefit and their efforts now helping lower the expected cost of a foreign attack by helping prevent a United States attack from being successful, or not happening at all. If Canada had no interest in the United States (e.g. the cost of terrorism in the United States was zero for Canada), but the United States still benefited from Canadian deterrence, the Canadian best response, and Canadian spending, would be unchanged and only that of the United States would decrease. The United States no longer needs to spend as much as in the symmetric model as they no longer need to counteract Canadian deterrence with their own deterrence for the purposes of deflection. Having Canada spend more than the United States would not sit well with Canadians because it can be seen as wasted spending, but in an economic sense, preventing an attack in the United States can be as important as preventing an attack in Canada.

When fully cooperating and when Canadian deterrence acts as pre-emption, Canada is left with all of the bill, marking a scenario where full-cooperation is far from being financially beneficial. If we think about it in the analogy where the two live in the same house with Canada on the main floor and the United States in the basement, it is more efficient for Canada to increase main floor security than for the United States to increase basement security, as the Canadian security protects both floors. To lower the household cost of security plus that of the expected cost of being robbed, it is best if the security is only on the main floor. We can think of this as having a security sticker on the main door. This sticker should prevent burglars from stealing on both floors. This allocation may not be fair, but being efficient does not necessarily mean fair. This type of full-cooperation is
highly unlikely though, as the United States would never eliminate their security and trust Canadian security. But this shows us why the United States would push for higher Canadian deterrence and spending, as not only is it more efficient, but it can lower the probability of terrorism in the United States and lowers the burden on the United States.

So in contrast to the case where Canadian deterrence and spending deflects attacks, efficiency is not financially beneficial for Canada. This is in line with those saying that cooperating with the United States is financially bad for Canada. Not only does efficiency increase spending compared to the non-cooperative level, autarky decreases spending, providing evidence that having no economic or security relationship with the United States would be beneficial for Canada (ignoring potential economic costs).

When being economically intertwined, Canada is spending more than the United States, which would not please Canadians. This creates a sort of tension where Canada is better off in autarky, but the United States is better off in full-cooperation. This presents an argument that the two countries should come to some compromise, with their spending somewhere in between the two equilibriums. Or if one country had leverage over the other, it could be used to push for an equilibrium in their favour. This fits well with the Canadian skepticism that cooperation leads to an increase in spending in numerical value, and relative value, compared to the United States. However, autarky still has Canada spending equal amounts compared to the United States, a relative level of spending most Canadians would consider to be too high. This scenario is presented in the following result.

Result 4: When Canadian deterrence acts as pre-emption, Canada spends more than the United States at the non-cooperative (Nash) equilibrium. At the Pareto efficient equilibrium Canada is the only country deterring. Autarky decreases spending
compared to the non-cooperative equilibrium. Ignoring possible economic costs from becoming independent of the United States, it is in Canada’s best financial interest to act independently or even break away from the United States.

This result is particularly interesting, as it presents opposite results from when Canadian deterrence deflects attacks, bringing an opposing argument compared to the economic literature that countries are financially better off cooperating. It also presents a scenario where one country wants to cooperate while the other does not, causing a disagreement on whether to work together.

Now that we know how all the individual modifications (parameter asymmetry, terrorist bias, and pre-emptive Canadian deterrence) alter the symmetric Sandler and Siqueira (2006) model, we can present multiple modifications in a single combined model to determine how they interact.

4.7 Combined Model

Providing a combined model with multiple modifications to Sandler and Siqueira’s (2006) model will allow us to fully understand how parameter asymmetries and the inclusion of Canadian deterrence acting as pre-emption interact. We only include the bias (preference) parameter $z$ in the sensitivity analysis located in Appendix C. This is due to preference being dynamic in nature and hard to accurately represent in a static model. It is still presented in section 4.5 because it is important to understand how the bias affects the outcome of the model to the best of our ability in an independent manner (i.e. by itself), and to illustrate the difficulties in measuring it. Presenting it in a combined model that hopes to represent reality to the best of our ability cannot be done with confidence when $z$ is included. Thus, the outcome of this combined model with all values of $z$ from 0 to 1 is represented in Appendix C to illustrate how bias (which we argue can shift from year to year), can affect spending at different levels. Unlike preference, it is safe to assume costs and bilateral relationships are constant over time.
Before bringing together the modifications, the first step is choosing more realistic obstacle parameter values.

### 4.7.1 Quantifying the Obstacle Parameters

Quantifying obstacles is extremely difficult. Mountains, oceanic ports, and even the wind can be considered an obstacle or advantage. However, we see no reason why Toronto, or Canada, would have less obstacles than the United States, and specifically NYC. The two cities offer little geographical strategic obstacles to terrorism other than defensive measures aimed to prevent attacks. The only real obstacle is in Toronto’s favour, and is the lack of direct contact to international waters, making a ballistic attack from the East (although unlikely due to both countries being strategically protected under NORAD), or an attack originating at an oceanic port to be more likely to occur in NYC. Country wise, both are located in the same geographical area and both have geography ranging from the mountain ranges to the prairies. The United States is Canada’s only direct geographical neighbour, and Canada and Mexico are the only American neighbours, giving a possible neighbouring advantage to Canada (although Canada is close to Russia). Therefore, we give Canada only a slight advantage, giving Canada a value of 0.2 and the United States zero. As always, these value are no more than educated/plausible guesses.

### 4.7.2 Combined Model Simulation

Using the obstacle parameter values $\varnothing_{US} = 0, \varnothing_{CAN} = 0.2$ along with the other asymmetric cost parameters of $H=0.0638, A=0.0160$ (successful and unsuccessful home attack for US), $h=0.0001, a=0.000025$ (successful and unsuccessful foreign attack for US), $F=0.0214, K=0.0055$ (successful and unsuccessful home attack for CAN), $f=0.0110$ and $k=0.0028$ (successful and unsuccessful foreign attack for CAN) and we get the following results.
Again, we see the best response functions being almost linear due to the obstacle parameters causing a lesser curvature from smaller derivatives in absolute value. When Canadian deterrence helps the fight against terrorism in the United States, Canada’s best response function still shift upwards while the American best response function rotates towards the Canadian axes and becomes convex. The difference is that the cost asymmetries move the equilibriums below the 45° line. Canadian deterrence as pre-emption in this scenario is not strong enough to offset the cost asymmetries.

**Figure 23: Combined Model Graph (shown as the probability of terrorist failure)**

![Combined Model Graph](image)

**Table 16: Canadian Combined Model Probability of Terrorist Failure and Spending Values**

<table>
<thead>
<tr>
<th>CANADA - Spending amount in parentheses (CAD Millions)</th>
<th>Nash Equilibrium</th>
<th>Pareto</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Globalized</strong></td>
<td>0.0226 ($984.4864)</td>
<td>0.0725 ($10140.3575)</td>
</tr>
<tr>
<td><strong>Autarky</strong></td>
<td>0.0126 ($306.2798)</td>
<td>0.0000 ($0.0000)</td>
</tr>
</tbody>
</table>
Table 17: United States Combined Model Probability of Terrorist Failure and Spending Values

<table>
<thead>
<tr>
<th></th>
<th>Nash Equilibrium</th>
<th>Pareto</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globalized</td>
<td>0.0808 ($108095.9982)</td>
<td>0.0573 ($54362.0892)</td>
</tr>
<tr>
<td>Autarky</td>
<td>0.0874 ($126476.4771)</td>
<td>0.0708 ($82995.2830)</td>
</tr>
</tbody>
</table>

Compared to the non-cooperative equilibrium when Canadian deterrence acts as pre-emption, full-cooperation presents a higher level of spending for Canada, to the point where the difference lies in Canada spending more or less than the United States. But now, the parameter asymmetries force the United States to split some of the cost when cooperating. Also, not encountered in previous cases, the autarky efficient equilibrium has the Americans being the only country spending money. The scenario is highlighted in the following result.

**Result 5:** When Canadian deterrence acts as pre-emption, the cost of a home attack is larger for the United States, the cost of a foreign attack are larger for Canada, and Canada holds an obstacle advantage in combating terrorism, Canada will spend less than the United States at the non-cooperative (Nash) equilibrium, but more when fully cooperating. Both the non-cooperative autarky and the fully-cooperative autarky level are financially beneficial for Canada.

This scenario has Canada seeing a wide range of possible Canadian spending levels, all dependent on the type of relationship they hold with the United States. It shows how important different relationships play an important role in the decision making of antiterrorism policy, and how understanding the degree of the relationship is crucial before criticizing Canadian antiterrorism spending. We can see that when Canadian deterrence has characteristics of pre-emption, it is not irrational that the United States would call for increased Canadian deterrence. It 1) decreases the risk of future attacks in the United States, 2) can lower the cost burden of the United States, and
3) brings the two countries closer to efficiency. The only cost is Canadian higher spending. This leaves us with our final result.

**Result 6: When Canadian deterrence has characteristics of pre-emption, it presents an argument that higher Canadian spending is caused by a strong economic relationship with the United States. This economic integration leads to a higher level of spending, while cooperating on how much deterrence (and hence spending) each country should undertake further increases Canadian spending. This cooperation is financially beneficial for the United States, presenting a reason for the United States to push for as much Canadian deterrence as they can.**

So why does Canada not end its economic relationship with the United States if it comes with higher antiterrorism security spending? If the reason for the relative increase in deterrence is due to Canada attempting to protect its foreign interests in the United States and from American pressure to cooperate, it makes initial sense that Canada should end this relationship. This would eliminate the need for increased antiterrorism spending. But we cannot forget about the economic benefits of a globalized economy with the United States. With Canada being economically dependent on the United States economy, the United States is in a position to limit its bilateral trading with Canada if they do not increase their deterrence closer to cooperation. Doing this is in line with the thought that “security trumps trade” in the United States.\(^{34}\) The United States would see a decline in their economy from limiting trade with Canada, but it would pale in comparison to the hit that the Canadian economy would take.

So for Canada, if the economic benefits of trading with the United States outweigh the cost of increased antiterrorism security, Canada should accommodate American recommendations for

\(^{34}\) The thought that “security trumps trade” could provide a reason to argue that even if Canada increases spending closer to the cooperative equilibrium level of spending, the United States would not decrease their spending to do the same, opposite of what the model theorizes.
cooperation. Until Canada is more independent on the world stage, Canada will always need to consider what the American reaction to their policies and spending are. Strategic interactions always need to be taken into account, cooperatively and non-cooperatively. This shows that there are more than public safety that need to be taken into account when determining antiterrorism policy and spending in Canada. MacDonald (2011) argues that economic security is more important for Canadians than terrorism security, but we argue that Canada’s strong stance on terrorism has economic motives.

The potential economic cost of not moving closer to full-cooperation for Canada caused by the United States making trade more difficult is presented in the concluding chapter. Followed by that is a discussion on how the model compares to relative spending in reality, a discussion on future work, and what should be taken away from this thesis for future work on antiterrorism policy research.
Chapter 5: Conclusion

In Chapter 3 we discussed how the Canadian government was hesitant at first to participate in the War on Terror. While Canada did introduce some domestic policies without hesitation (Canadian Anti-Terrorism Act of 2001) with the public’s safety in mind, in general this fell short of the level of cooperation the United States desired. This is highlighted by former United States Ambassador to Canada Paul Cellucci, who was quoted in the National Post as saying that “a lot of people in Washington are upset that Canada is not fully supporting us” (Redman, 2003). We argue that part of the reason for Canada’s eventual acceptance of so many similar new security programs to the United States is from Canada realizing that preventing the loss of the economic gains from trade is arguably more important for the Canadian economy than the financial loss of cooperation with the United States. Higher cooperation, specifically on border security, decreases border crossing line ups and decreases the cost of conducting business across borders. Lower cooperation (and hence lower Canadian deterrence) causes the United States to limit the ease of border crossing to prevent terrorists from hopping borders, and can have negative economic consequences for Canada. Until Canada no longer is as dependent on the American economy, the United States will be able to pressure Canada to increase antiterrorism spending. This is a key motivation for spending that would need to be considered in a cost-benefit analysis of current Canadian spending.

We can examine what this potential economic loss would have been for Canada had it elected not to increase deterrence given the new threat seen from 9/11. By examining exports and imports with the United States, we can calculate the effect certain reductions in trade would have had on the Canadian economy. In no way is this meant to be a thorough or complex estimation but simply to provide an idea of what the loss may have looked like. The graph below provides a graphical representation of the loss to GDP each year, over time.
Estimating, a 10% reduction in trade in all years starting in 2003 until the end of 2012 would have cost the Canadian economy over $122 billion, given the path net exports has taken as given. A 20% reduction would cost the economy over $245 billion, and 50% would cost the economy over $614 billion. In a drastic scenario where the United States cuts all trade with Canada, it would reduce total GDP over that time by $1.2 trillion. If we were to compare any of the calculations provided in this paper on actual Canadian antiterrorism spending (Chapter 3 Section 3.4.3, General Auditor, or MacDonald (2011)), we can observe that the potential loss to GDP is higher than what has been spent on antiterrorism for all percentages examined. This is also considering that the calculations done in this thesis and by MacDonald (2011) are upper bounds. While we need to be careful when making conclusions as these numbers are preliminary and do not take into account the Canadian economy eventually rebounding, they provide some evidence that the loss to GDP could have outweighed the antiterrorism spending. Not only would Canada have lost output from losing a trade partner if Canada decided to not increase spending and cooperate to some degree,
fully cooperating and integrating their economies would arguably increase the economic gain significantly.

To fully evaluate this claim, though, there would need to be a full cost-benefit analysis done which is outside the scope of this thesis. In the meantime, it is worthwhile to relatively compare the model to the real word. By getting data on American spending, we can determine where the relative spending between the two countries truly lies. We can also scope the globe to find a country that best represents an autarky type relationship with the United States to determine whether autarky would increase or decrease spending. Knowing this provides evidence on whether Canadian deterrence deflects or acts as pre-emption.

5.1 Theoretical Model Relative Spending vs. Real World Relative Spending

Chapter 4 provided scenarios where, depending on the chosen parameters, Canadian antiterrorism spending can be far below, or above the American level of spending. Using real world spending data for a small number of antiterrorism related departments in Canada and the United States we can compare this data to the models outcomes in Chapter 4. This is not meant to determine the most realistic theoretical scenario, but to show where Canadian spending stands with respect to each scenario and to determine whether real world data provides any evidence of the motives presented in the model. The following table 18 provides spending by three antiterrorism related departments in Canada and the United States in terms of percentage of GDP.
Table 18: Canadian-United States Department Spending Comparison (2013-2014 % of GDP)


<table>
<thead>
<tr>
<th>Department</th>
<th>CANADA</th>
<th>Canadian Security Policy Characteristic</th>
<th>UNITED STATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation Security</td>
<td>CATSA 0.0362%</td>
<td>Pre-emption</td>
<td>TSA 0.0473%</td>
</tr>
<tr>
<td>Border Security</td>
<td>CBSA 0.1015%</td>
<td>Pre-emption</td>
<td>US CBP 0.0826%</td>
</tr>
<tr>
<td>Public Safety</td>
<td>Public Safety Canada 0.0266%</td>
<td>Deterrence</td>
<td>Homeland Security 0.3878%</td>
</tr>
</tbody>
</table>

In the parameter asymmetry (section 4.4), and the terrorist bias (section 4.5) scenarios (based on the traditional deterrence game) we witness Canadian spending being less than the United States at the non-cooperative equilibrium. At the cooperative efficient levels in the terrorist bias scenario the United States is also spending far more than Canada. Using the three departments from above, Canada is nowhere near spending the relative difference seen in these scenarios. If these asymmetric traditional deterrence models are accurate in depicting the Canada-United States relationship in reality, it would indicate that Canada is drastically over-spending compared to the ‘recommended’ levels in the models. Alternatively, it could indicate that we wrongly estimated the relative parameter asymmetries, but it is unlikely that they are incorrect to the point of a complete 180° turn.

It is more likely that this data is validating our argument that Canadian deterrence has characteristics of pre-emption.\(^{35}\) In the two scenarios where Canadian deterrence acted as pre-

---

\(^{35}\) This doesn’t mean that the previous models are useless, though, as they show us how parameters and probability asymmetries can individually shape outcomes. We can later overlap the changes to see a final outcome.
emption (sections 4.6 and 4.7), we saw a strong possibility of Canada spending more than the United States. Here, both transportation and border security see higher Canadian spending or very similar spending to that of the United States. Both of these Canadian security programs have been pushed by the United States and have shown to be beneficial for the American fight against terrorism, making the programs appear to have strong characteristics of pre-emption. Affirming this, strong Canadian border and transportation security can directly impact whether terrorists enter the United States through Canada or not. We also need to remember for transportation security that the TSA is part of the Department of Homeland Security, whereas CATSA is a different entity than Public Safety Canada. The TSA also has a wider range of responsibilities. If we were able to break down department spending to similar responsibilities (which we unfortunately cannot do), it may turn out that Canada is spending equal, or more, than the United States, providing even more evidence that Canadian deterrence acts as pre-emption in the context of our model. This also provides an argument that while Canadians may believe terrorism is primarily an American issue, our multidimensional relationship with them causes higher spending to be in Canada’s best interest.

5.2 Preliminary Evidence of Autarky Lowering Antiterrorism Spending

To observe what potential autarky spending might look like, we can compare Australian spending to that of Canada and the United States. Specifically we can look at border security, since it is a department where Canadian spending outweighs American spending as a percentage of GDP. Australia presents the best country for our autarky scenario as it has similar economic size to
Canada, does not share a border with the United States, and has far less trading with the United States than Canada.\textsuperscript{36}

As a reminder, the United States spends approximately 0.0826\% of GDP on border security, and Canada spends approximately 0.1015\% of GDP. Australia, who for 2013-2014 have projected to spend $1.45 billion (CAD) on border security (Australian Customs and Border Protection Service 2013-2014 Budget, 2013), spent in between Canada and the United States with 0.0954\% of GDP. This provides evidence that autarky lowers antiterrorism spending. Australia is in a position where their border security most likely does not help the American effort and foreign costs would be minimal compared to Canada. Australia, like Canada, also has not had any successful large scale terrorism immediately before or any time after 9/11 that would have spurred further reaction.

When it comes to border security, it can be argued that the model where Canadian deterrence acts as pre-emption is most realistic, and if Canada was in Australia’s geographic and economic relationship they would not be spending as much (shown through Australia’s spending). It is the geography and economic integration that appear to motivate Canadian spending beyond that needed purely for domestic public safety. Being economically integrated and geographical neighbors with the United States causes autarky to have lower antiterrorism costs, and could cause cooperation to increase spending for Canada. Cooperation ends up being a double edged sword for Canada, where cooperating or not cooperating both come with increased costs. One with higher antiterrorism spending, and one with lower trade. It comes down to which presents the least net loss (or highest net benefit).

\textsuperscript{36} Australia exports to the United States are less than 3\% of that Canada exports to the United States (United States Census Bureau, 2014)
5.3 Conclusion and Future Research Areas

Without further focus on the many issues presented and discussed in this thesis, terrorism research in Canada, and in general, will not be able to advance. This includes finding a universally accepted definition of terrorism and properly understanding the history and motives of (anti) terrorism in a country before beginning to criticize it. For Canada we have discussed how its relationship with the United States is an important factor to take into consideration when discussing what Canadian spending should be. Canada’s economic loss following 9/11 was an indication that Canada should not only be worried about future terrorism in Canada, but also that in the United States. Being in the geographic and economic situation that it is in allows Canadian policy to lower the probability of an attack occurring in the United States. Whether the two cooperate or not is a semi-separate topic, and as we have shown it can be financially costly for Canada unless an economic incentive to do so is presented. The strategic interaction between the two countries cannot be ignored when criticizing spending.

When working with this type of a theoretical model, there are a number of areas that can be improved upon or modified to better fit international antiterrorism relationships, the biggest being the estimation of the parameter values. While our choice of parameter values are based on a simple estimation, future work should attempt to use more accurate estimation techniques. Being able to better understand the costs of terrorism for a country allows policy makers to introduce proper policies to lower the probability of these costs occurring. While there have been numerous studies in the United States on the cost estimation of CBRN attacks, to our knowledge there has been no such work in Canada.

In terms of modifying the model, changes could be made to allow the effect of deterrence on the home country to not necessarily be positive, but convex. This allows there to be a point where too
much deterrence actually increases the probability of being attacked due to a public sense of government oppression. Similar models could also be turned into a multi-stage or dynamic game, where choices and preferences change over time. There could also be work on introducing trade directly into the model.

Economic research on terrorism is still only in the beginning stages, particularly in Canada. More work needs to be done to fully understand how governments and terrorists react to each other, and how governments should utilize their resources for fighting terrorism. Many researchers conclude that full cooperation among nations is needed to end the collective action problem faced when fighting terrorism, but we have shown that there exist asymmetric relationships that do not make cooperation financially beneficial for all countries. Without incentives to cooperate outside of ending global terrorism, it can be extremely difficult to create a cooperative system of governments fighting against terrorism. Specifically for Canada, where terrorism is often argued as an American issue, it can be extremely difficult to persuade the public that increased antiterrorism security and spending is truly in their best interest for safety and beyond.
Bibliography


*Global Terrorism Database (GTD)*. (2013).


Appendix A: Derivate Proofs

A.1: Symmetric Deflection Probability Function

These results hold for both countries. \( i, j = US, CAN \) and \( i \neq j \). \( i \) is the home country and \( j \) is the foreign country.

First-order Condition: \( \frac{\partial \pi_i}{\partial x_i} = -\frac{x_j}{(x_i+x_j)^2} < 0 \)

Second-order Condition: \( \frac{\partial^2 \pi_i}{\partial x_i^2} = \frac{2x_j}{(x_i+x_j)^3} > 0 \)

First-order Cross Partial: \( \frac{\partial \pi_j}{\partial x_i} = \frac{x_j}{(x_i+x_j)^2} > 0 \)

Second-order Cross Partial: \( \frac{\partial^2 \pi_j}{\partial x_i^2} = -\frac{2x_j}{(x_i+x_j)^3} < 0, \frac{\partial^2 \pi_j}{\partial x_i \partial x_j} = \frac{-x_j+x_i}{(x_i+x_j)^3} > 0 \)

A.2: Symmetric Probability Function with Canadian Deterrence having characteristics of Pre-emption for the United States

First-order Condition: \( \frac{\partial \pi_{US}}{\partial x_{US}} = -\frac{\phi_{CAN}}{(x_{US}+x_{CAN}+\phi_{US}+\phi_{CAN})^2} < 0 \)

Second-order Condition: \( \frac{\partial^2 \pi_{US}}{\partial x_{US}^2} = \frac{2\phi_{CAN}}{(x_{US}+x_{CAN}+\phi_{US}+\phi_{CAN})^3} > 0 \)

First-order Cross Partial: \( \frac{\partial \pi_{US}}{\partial x_{CAN}} = \frac{\phi_{CAN}}{(x_{US}+x_{CAN}+\phi_{US}+\phi_{CAN})^2} < 0 \)

Second-order Cross Partial: \( \frac{\partial^2 \pi_{US}}{\partial x_{US} \partial x_{CAN}} = \frac{\partial^2 \pi_{US}}{\partial x_{US} \partial x_{CAN}} = \frac{2\phi_{CAN}}{(x_{US}+x_{CAN}+\phi_{US}+\phi_{CAN})^3} > 0 \)
A.3: Symmetric Probability Function with Canadian Deterrence having characteristics of Pre-emption for Canada

First-order Condition: \[ \frac{\partial \pi_{CAN}}{\partial x_{CAN}} = -\frac{\phi_{US} + x_{US}}{(x_{US} + x_{CAN} + \phi_{US} + \phi_{CAN})^2} < 0 \]

Second-order Condition: \[ \frac{\partial^2 \pi_{CAN}}{\partial x_{CAN}^2} = \frac{2(\phi_{US} + x_{US})}{(x_{US} + x_{CAN} + \phi_{US} + \phi_{CAN})^3} > 0 \]

First-order Cross Partial: \[ \frac{\partial \pi_{US}}{\partial x_{CAN}} = \frac{\phi_{US} + x_{US}}{(x_{US} + x_{CAN} + \phi_{US} + \phi_{CAN})^2} > 0 \]

Second-order Cross Partial: \[ \frac{\partial^2 \pi_{US}}{\partial x_{CAN}^2} = \frac{-2(\phi_{US} + x_{US})}{(x_{US} + x_{CAN} + \phi_{US} + \phi_{CAN})^3} < 0, \]

\[ \frac{\partial^2 \pi_{CAN}}{\partial x_{CAN} \partial x_{US}} = \frac{\phi_{US} + x_{US} - x_{CAN} - \phi_{CAN}}{(x_{US} + x_{CAN} + \phi_{US} + \phi_{CAN})^2} \leq 0 \]
Appendix B: Terrorist Bias Calculation

Bias is determined by terrorists before taking into account other factors in the probability of being attacked function (e.g. cost of an attack, probability of failure), therefore we assume symmetry in relative deterrence effort and in the expected cost functions. We estimate $z$ using the data from ITERATE which provides results saying 97% of all attacks towards Canadian and American interests were towards American interests. This gives us the equation $0.97 = z + (1 - z) \cdot \frac{0.5}{0.5 + 0.5}$. Solving for $z$, we get $z = 0.94$.

This method is not without fault. This data is naturally dynamic, while the model is static. It is impossible to know what terrorist preference is in any given moment in time. It is also possible that terrorist preference has shifted since 9/11 as Canada was listed as a main target by Bin Laden during the May 2011 raid that saw him killed (Bell, 2013).
Appendix C: Sensitivity Analysis Results

Sensitivity Analyses done for the scenarios examined in Chapter 4 follow.

C.1 Parameter Asymmetry Sensitivity Analysis

We can provide sensitivity analysis to highlight cases where each parameter value is shifted to get a better understanding of their role in the model. To do so, the parameters are increased and decreased by 50%. The parameters we look at are $H$, $F$, and $f$. $h$ is not looked at due to its small value causing little to no change to the model. The unsuccessful cost parameters are not looked at due to them having the same effect, although smaller, as their respective successful parameters. We can see how these shifts in parameter value change the best response functions below.

A 50% increase in parameter value is denoted as $BR_{i+50}$ ($i = \text{CAN, US}$), with a 50% deduction having similar notation with a negative sign instead of positive. $x_2$ refers to Canada, and $x_I$ refers to the United States.

Table 19: Parameter Sensitivity Analysis (H)  
Table 20: Parameter Sensitivity Analysis (F)
All shifts in parameter value give sensible changes. An increase in the cost of a successful attack at home for the United States $H$, increases its deterrence level to combat this increase in cost. Similarly, a decrease in cost brings the function closer to the origin. For Canada, we observe similar results for changing the cost of a successful attack at home, however a 50% reduction in the cost of an attack at home decreases the function more than seen with the increase. The small increase in deterrence due to a 50% increase in cost is due to the fear of attacks being deflected abroad, increasing the expected cost on their interests abroad. There is no surprises for the changes to a successful attack abroad for Canada, as an increase in the cost decreases Canadian deterrence to prevent attacks from being deflected abroad.

### C.2 Sensitivity Analysis of Terrorist Preference

A sensitivity analysis is not needed for the terrorist preference parameter as the case $z=0$ is presented in the symmetric scenario, and $z=0.94$ was seen in section 4.5. A lower $z$ than 0.94 ($0 \leq z \leq 1$)
will bring the model closer to symmetry, while a higher \( 0.94 < z \leq 1 \) will further distance the points from symmetry.

### C.3 Obstacle Parameter Sensitivity Analysis when Canadian Deterrence acts as Pre-emption

To show what happens when the obstacle advantage is in favour of either country, we provide scenarios where \((\varnothing_{US} = 0.1, \varnothing_{CAN} = 1)\) and \((\varnothing_{US} = 1, \varnothing_{CAN} = 0.1)\). In the graph the symmetric case equilibrium is shown as NE1. When the United States holds the advantage the equilibrium is shown as NE2, and when Canada holds the obstacle advantage \((\varnothing_{US} = 0.1, \varnothing_{CAN} = 1)\), the equilibrium is shown as NE3. Symmetry has Canada spending more than the United States due to Canada having foreign interest in the United States and having the ability to lower the expected cost of terrorism on these foreign interests by increasing its deterrence, which has characteristics of pre-emption.

**Table 22: Obstacle Parameter Sensitivity Analysis**
In the Nash equilibrium where the United States hold the advantage ($\emptyset_{US} = 1, \emptyset_{CAN} = 0.1$), shown as NE$_2$, Canada has lower deterrence spending compared to symmetry (NE$_1$), but higher in comparison to the United States who drastically lowers their spending. This is caused by the United States now having a lower probability of being attacked and not needing to deflect attacks towards Canada (even more so than in the symmetric model). The opposite occurs for when Canada holds the obstacle advantage, shown as NE$_3$, where the United States now has a higher spending level compared to Canada.

**C.4 Combined Model Sensitivity Analysis**

There are no additional surprises when the sensitivity analysis is done for the combined model. The changes from an increases (decreases) in cost parameters remain the same compared to section 4.4.2. The same can be said for changes in the obstacle parameters done in section 4.7.1. To prevent repetition, the only sensitivity analysis shown is for the bias (preference) parameter $z$. The extent of its negative effect on the Canadian probability of terrorist failure, $x_{CAN}$, is shown in the graph below.

**Table 23: Effect of Terrorist Preference on Canadian Deterrence Levels**

![Graph showing the effect of terrorist preference on Canadian deterrence levels.](12257.png)
The higher the terrorist preference of attacking the United States is, the lower Canadian deterrence spending is (shown through the probability of terrorist failure). United States deterrence also decreases as the need to increase deterrence for deflection is no longer needed at the extent if $z=0$, only not at the same rate as Canadian deterrence.
Appendix D: Maple 16 Code: Combined Model

#2 COUNTRY DETERRENCE GAME#

> with( plots ) :

# We look at cases (1) where Canadian deterrence has characteristics of pre-emption and acts as a public good, and (2) where Canadian deterrence efforts increase the probability of an attack in the United States, but decrease the probability of being attacked in Canada.

# First we assign values for the parameters, then solve for the simultaneous move (non-cooperative) equilibrium, the Pareto efficient (full-cooperative) allocation, the autarky simultaneous move equilibrium, and the Stackelberg (leader-follower) equilibrium.

#Country 1 = United States
#Country 2 = Canada
#Country 1 = United States #Country 2 = Canada

> #Assign values to $H$, $h$, $A$, $a$, $F$, $f$, $k$, $z$ and $x1x$, $x2x$, $x1$ and $x2$ are unknowns. $h$ = cost of a successful attack on foreign interests for country 1.
> $H$ = Cost of a successful attack at home for country 1.
> $a$ = cost of a failed attack on foreign interests for country 1.
> $A$ = cost of a failed attack at home for country 1.
> $f$ = cost of a successful attack on foreign interests for country 2.
> $F$ = cost of a successful attack at home for country 2.
> $k$ = cost of a failed attack on foreign interests for country 2.
> $K$ = cost of a failed attack at home for country 2.
> $h$ = the bias that transnational terrorists have of attacking the country 1 instead of country 2.

#x1x = a parameter for some kind of obstacle that protects country 1 by reducing its likelihood of being attacked, but increases the likelihood of country 2 being attacked.

#x2x = a parameter for some kind of obstacle that protects country 2 by reducing its likelihood of being attacked, but increases the likelihood of country 1 being attacked.

# $a$, $f$, $k$ = foreign costs in autarky

> $h := 0.0001 :
> H := 0.0638 :
> a := h/4 :
> A := H/4 :
> f := 0.0110 :
> F := 0.0214 :
> k := f/4 :

148
$K := \frac{F}{4}$
$\tau := 0$
$x1x := 0$
$x2x := 0.2$
$\alpha := 0$
$f := 0$
$\kappa := 0$
$\theta := 0$

(1)

**#SIMULTANEOUS MOVE GAME#**

**#Government Expenditure Functions#**

#Governments 1 and 2 (denoted $G_1$ and $G_2$) decide expenditure level based on $x_i$ ($i=1,2$), the probability of a terrorist failure at home.

> #G1=US government expenditure function  
#G2=CANADA government expenditure function  
\[ G1 := x1^2 \]  
\[ G2 := x2^2 \]  

**#Check Derivative Signs#**

#make sure the first and second order derivatives of $G_1$ and $G_2$ are positive.

> \texttt{diff} (\% x2)

\[ 2 \times 2 \]  
(2)

> \texttt{diff} (\% x2)

\[ 2 \]  
(3)
# Probability of being attacked functions

The probability government i (i=1, 2) is attacked is given as a function of \(x, x_1, x_2, F, f, H, h, x_{1x}, \) and \(x_{2x}\) and it dependent on the relative values of the parameters. \(P1\) and \(P2\) both fall between 0 and 1.

We denote \(P1_{\text{public good}}\) for the probability function given Canadian deterrence efforts having characteristics of pre-emption and acting like a public good, and \(P1_{\text{defection}}\) for the probability function given Canadian deterrence effort having the traditional characteristics of deterrence and deflecting attacks abroad.

\[
P1_{\text{public good}} = \frac{0.2}{x_1 + x_2 + 0.2}
\]
\[
P1_{\text{defection}} = \frac{x_2 + 0.2}{x_1 + x_2 + 0.2}
\]

\(>\) #US probabilities of being attacked

\[
P1_{\text{public good}} = z + (1 - z) \cdot \left(\frac{x_2}{x_1 + x_2 + x_{1x} + x_{2x}}\right);
\]
\[
P1_{\text{defection}} = z + (1 - z) \cdot \left(\frac{x_2 + x_{2x}}{x_1 + x_2 + x_{1x} + x_{2x}}\right);
\]

\[
\frac{\partial}{\partial x_1} (P1_{\text{public good}}) = \frac{x_2}{(x_1 + x_2 + 0.2)^2}
\]
\[
\frac{\partial}{\partial x_2} (P1_{\text{public good}}) = \frac{x_2 + 0.2}{(x_1 + x_2 + 0.2)^2}
\]

\[
\frac{\partial}{\partial x_1} (P1_{\text{defection}}) = \frac{0.2}{(x_1 + x_2 + 0.2)^2}
\]
\[
\frac{\partial}{\partial x_2} (P1_{\text{defection}}) = \frac{x_2 + 0.2}{(x_1 + x_2 + 0.2)^2}
\]

\(>\) #P1 first order derivative wrt x1 should be negative. \(\frac{\partial}{\partial x_1} (P1_{\text{public good}})\); \(\frac{\partial}{\partial x_1} (P1_{\text{defection}})\);

\[
\frac{\partial}{\partial x_1} (P1_{\text{public good}}) = \frac{x_2}{(x_1 + x_2 + 0.2)^2}
\]
\[
\frac{\partial}{\partial x_1} (P1_{\text{defection}}) = \frac{0.2}{(x_1 + x_2 + 0.2)^2}
\]

\(>\) #P1 second order derivative wrt x1,x1 should be positive.

#Reasoning: Deterrence limits the probability of a home attack with diminishing returns.

\(\frac{\partial^2}{\partial x_1^2} (P1_{\text{public good}})\); \(\frac{\partial^2}{\partial x_1^2} (P1_{\text{defection}})\);
\[
\frac{0.4}{(xI + x2 + 0.2)^3}
\]

\[
\frac{2 (x2 + 0.2)}{(xI + x2 + 0.2)^3}
\]

(6)

> 

# P1\_deflection first order derivative wrt to x2 should be positive. Greater deterrence by Canada positively affects the probability of a terrorist attack in the US. P1\_public good first order derivative wrt to x2 should be negative. Greater deterrence by Canada negatively affects the probability of a terrorist attack in the US.

\[
\text{simplify}\left(\text{diff}\left(\text{P1\_deflection, x2}\right)\right);
\]

\[
\text{diff}\left(\text{P1\_public good, x2}\right);
\]

\[
\frac{25. x1}{(5. xI + 5. x2 + 1.)^2}
\]

\[- \frac{0.2}{(xI + x2 + 0.2)^2}
\]

(7)

> 

# P1\_deflection second order derivative wrt x2, x2 should be negative. Positive for P1\_public good.

# Reasoning: Greater deterrence by country 2 increases the probability of an attack on country 1 at a decreasing rate with P1\_deflection.

\[
\text{simplify}\left(\text{diff}\left(\text{diff}\left(\text{P1\_deflection, x2}\right), x2\right)\right);
\]

\[
\text{diff}\left(\text{diff}\left(\text{P1\_public good, x2}\right), x2\right);
\]

\[- \frac{250. x1}{(5. xI + 5. x2 + 1.)^3}
\]

\[
\frac{0.4}{(xI + x2 + 0.2)^3}
\]

(8)

> 

# Probability of an attack in Canada (country 2). Remains the same for both the deflection and public good game. 

# P2 = probability of being attacked for Canada
\[ P_2 := \frac{x_1 x + x_1}{x_1 + x_2 + x_1 x + x_2} \]

\[ P_2 = \frac{x_1}{x_1 + x_2 + 0.2} \quad (9) \]

#Check Derivative Signs#

Check the signs of the derivatives of the probability functions to make they satisfy the requirements listed below.

> **P2, first order derivative wrt x2** should be negative. \( \text{diff} (P_2, x_2) \);

\[ \frac{\text{diff} (x_1)}{(x_1 + x_2 + 0.2)^2} \quad (10) \]

> **P2, second order derivative wrt x2,x2** should be positive.
  
  **Reasoning:** Deterrence limits the probability of a home attack with diminishing returns.
  
  \( \text{diff}^2 (P_2, x_2, x_2) \) ;

\[ \frac{2 x_1}{(x_1 + x_2 + 0.2)^3} \quad (11) \]

> **P2, first order derivative wrt x1** should be positive. \( \text{diff} (P_2, x_1) \);

\[ \frac{1}{x_1 + x_2 + 0.2} - \frac{x_1}{(x_1 + x_2 + 0.2)^2} \quad (12) \]

> **P2, second order derivative wrt x1,x1** should be negative.
  
  **Reasoning:** Greater deterrence by country 1 increases the probability of an attack on country 2 at a decreasing rate.
  
  \( \text{diff}^2 (P_2, x_2, x_1) \) ;

\[ \text{diff}^2 (P_2, x_2, x_1) \left( \frac{x_1}{x_1 + x_2 + 0.2} \cdot x_2 \right) \left( \frac{1}{x_1 + x_2 + 0.2} - \frac{x_1}{(x_1 + x_2 + 0.2)^2} \right) \quad (13) \]

#Check Cross Derivative Sign#

**P1\_publicgood** should be positive as country 2's deterrence reduces the marginal impact of country i's deterrence efforts, owing to diminishing returns. Check **P1\_publicgood** second order derivative wrt x1,x2.

Should be ambiguous dependent on whether x1 ≠ x2. Some results for P2 second order derivative wrt x2,x1.
\[ \text{diff} \left( \text{diff} \left( P_1_{\text{public good}} x^1, x^2 \right), \text{diff} \left( P_1_{\text{defection}} x^1, x^2 \right) \right) \]

\[ = \frac{0.4}{(x^1 + x^2 + 0.2)^3} - \frac{1}{(x^1 + x^2 + 0.2)^2} + \frac{2(x^2 + 0.2)}{(x^1 + x^2 + 0.2)^3} \]

(14)

### Expected Damage Functions

Calculate the countries expected damage functions as functions of the costs associated with a successful and failed attack at home and in the other country, and the probability of a terrorist failure \((x^1, x^2)\). \(L = \text{home attack}\), \(V = \text{attack on foreign interests}\), \(V_{\text{autarky}} = \text{attack on foreign interests in autarky}\).

\[ \text{#L1 = Country 1 expected damage from a home attack.} \]
\[ L_1 := x^1 \cdot A + (1 - x^1) \cdot H \]
\[ \text{#V1 = Country 1 expected damage from an attack on foreign interests (in country 2).} \]
\[ V_1 := x^2 \cdot \alpha + (1 - x^2) \cdot h \]
\[ \text{#V1}_{\text{autarky}} = \text{Country 1 expected damage from an attack on foreign interests with autarky (in country 2).} \]
\[ V_{1\text{autarky}} := x^2 \cdot \alpha + (1 - x^2) \cdot \theta \]
\[ \text{#L2 = Country 2 expected damage from a home attack.} \]
\[ L_2 := x^2 \cdot K + (1 - x^2) \cdot F \]
\[ \text{#V2 = Country 2 expected damage from an attack on foreign interests (in country 1).} \]
\[ V_2 := x^1 \cdot \kappa + (1 - x^1) \cdot f \]
\[ \text{#V2}_{\text{autarky}} = \text{Country 2 expected damage from an attack on foreign interests (in country 1).} \]
\[ V_{2\text{autarky}} := x^1 \cdot \kappa + (1 - x^1) \cdot f \]

\[ L_1 = -0.04785000000 x^1 + 0.0638 \]

\[ V_1 = -0.00007500000000 x^2 + 0.0001 \]

\[ V_{1\text{autarky}} = 0 \]

\[ L_2 = -0.01605000000 x^2 + 0.0214 \]
\[ V_2 := -0.008250000000 x I + 0.0110 \]

\[ V_{\text{autarky}} := 0 \] (15)

**Expected costs of terrorism for Governments**

Given the last four equations, we can get the expected costs of terrorism for a government, given as \( C_1 \) for country 1 and \( C_2 \) for country 2. This is done for both the autarky case and the globalized (foreign costs \( > 0 \)) case. The autarky case uses the deflection probability, while the globalized case uses the public good probability since the United States only cares about what occurs within Canada in a globalized world. Cost is equal to the amount of expenditure spent on antiterrorism measures plus the expected damages of a domestic or foreign attack.

\[ C_1 = \text{expected cost functions for the US in globalized or autarky economies} \]

\[ C_2 = \text{expected cost functions for CANADA in globalized or autarky economies} \]

\[ C_{1, \text{globalized}} := G_1 + P_1 \cdot \text{publicgood} \cdot L_1 + P_2 \cdot V_1 ; \]

\[ C_{1, \text{autarky}} := G_1 + P_1 \cdot \text{deposition} \cdot L_1 + P_2 \cdot V_{1, \text{autarky}} ; \]

\[ C_{2, \text{globalized}} := G_2 + P_2 \cdot L_2 + P_1 \cdot \text{publicgood} \cdot V_2 ; \]

\[ C_{2, \text{autarky}} := G_2 + P_2 \cdot L_2 + P_1 \cdot \text{deposition} \cdot V_{2, \text{autarky}} ; \]

\[ C_{1, \text{globalized}} = x_1^2 + \frac{0.2 \cdot (-0.04785000000 x_1 + 0.0638)}{x_1 + x_2 + 0.2} + \frac{x_1 \cdot (-0.00007500000000 x_2 + 0.0001)}{x_1 + x_2 + 0.2} \]

\[ C_{1, \text{autarky}} = x_1^2 + \frac{(x_2 + 0.2) \cdot (-0.04785000000 x_1 + 0.0638)}{x_1 + x_2 + 0.2} \]

\[ C_{2, \text{globalized}} = x_2^2 + \frac{x_1 \cdot (-0.01605000000 x_2 + 0.0214)}{x_1 + x_2 + 0.2} + \frac{0.2 \cdot (-0.00825000000 x_1 + 0.0110)}{x_1 + x_2 + 0.2} \]

\[ C_{2, \text{autarky}} = x_2^2 + \frac{x_1 \cdot (-0.01605000000 x_2 + 0.0214)}{x_1 + x_2 + 0.2} \] (16)
# Best Response Functions#

Best Response functions are BR1 and BR2 for country 1 and 2 respectively. Calculated as the first derivative of the cost functions. Done for both cases.

> **US (1) and CANADA (2) best response functions with globalized economies**

\[ BR1_{\text{globalized}} = \frac{\partial}{\partial x_1} (C_1_{\text{globalized}} x_1) \]

\[ BR2_{\text{globalized}} = \frac{\partial}{\partial x_2} (C_2_{\text{globalized}} x_2) \]

\begin{align*}
BR1_{\text{globalized}} &= 2 x_1 - 0.2 \left( -0.04785000000 x_1 + 0.0638 \right) - \frac{0.00957000000}{x_1 + x_2 + 0.2} \\
&\quad + \frac{-0.00007500000000 x_2 + 0.0001}{x_1 + x_2 + 0.2} \\
&\quad - \frac{-0.00000750000000 x_2 + 0.0001}{(x_1 + x_2 + 0.2)^2}
\end{align*}

\begin{align*}
BR2_{\text{globalized}} &= 2 x_2 - \frac{x_1 (0.01605000000 x_2 + 0.0214)}{(x_1 + x_2 + 0.2)^2} - \frac{0.01605000000 x_1}{x_1 + x_2 + 0.2} \\
&\quad - \frac{0.2 (-0.00825000000 x_1 + 0.0110)}{(x_1 + x_2 + 0.2)^2}
\end{align*}

\[ (17) \]

> **US (1) and CANADA (2) best response functions with in autarky**

\[ BR1_{\text{autarky}} = \frac{\partial}{\partial x_1} (C_1_{\text{autarky}} x_1) \]

\[ BR2_{\text{autarky}} = \frac{\partial}{\partial x_2} (C_2_{\text{autarky}} x_2) \]

\begin{align*}
BR1_{\text{autarky}} &= 2 x_1 - \frac{x_1 (x_2 + 0.2) (0.04785000000 x_1 + 0.0638)}{(x_1 + x_2 + 0.2)^2} - \frac{0.04785000000 (x_2 + 0.2)}{x_1 + x_2 + 0.2} \\
BR2_{\text{autarky}} &= 2 x_2 - \frac{x_1 (0.01605000000 x_2 + 0.0214)}{(x_1 + x_2 + 0.2)^2} - \frac{0.01605000000 x_1}{x_1 + x_2 + 0.2}
\end{align*}

\[ (18) \]

# Check Second Order Derivatives#

Make sure the second order derivatives of the best response functions are positive.

> \[ \frac{\partial^2}{\partial x_1^2} (BR1_{\text{globalized}} x_1), \frac{\partial^2}{\partial x_2^2} (BR2_{\text{globalized}} x_2) \]
\[
2 + \frac{0.4 \cdot (-0.04785000000 \cdot x_1 + 0.0638)}{(x_1 + x_2 + 0.2)^3} + \frac{0.01914000000}{(x_1 + x_2 + 0.2)^2} - \frac{2 \cdot (-0.00007500000000 \cdot x_2 + 0.0001)}{(x_1 + x_2 + 0.2)^2} + \frac{2 \cdot x_1 \cdot (-0.01605000000 \cdot x_2 + 0.0214)}{(x_1 + x_2 + 0.2)^3} + \frac{0.03210000000 \cdot x_1}{(x_1 + x_2 + 0.2)^2} + \frac{0.4 \cdot (-0.03825000000 \cdot x_1 + 0.0110)}{(x_1 + x_2 + 0.2)^3}
\]

**#PARETO EFFICIENT LEVEL#**

**#Total Cost Function#**

#Calculate the total cost function in order to calculate the pareto efficient level for both countries. This would be the case if the two countries cooperated completely on fighting terrorism together. To do so, differentiate the total cost function with respect to x1 and x2 and solve.

**#For the globalized case**

\[
C_{\text{globalized}} = C_{\text{globalized}1} + C_{\text{globalized}2}
\]

#Each country has the greater expected cost function

\[
x_1 := 0.5; \\
x_2 := 0.5; \\
US\text{cost} := L_1 + V_2; \\
CA\text{Ncost} := L_2 + V_1; \\
x_1 := 'x_1'; x_2 := 'x_2'; C_1\text{diff} := \text{diff} (C_{\text{globalized}1} \cdot x_1); C_2\text{diff} := \text{diff} (C_{\text{globalized}2} \cdot x_2); \text{ParetoValues}_{\text{globalized}} := \text{solve} ((C_1\text{diff} = 0, C_2\text{diff} = 0), (x_1, x_2)); \text{assign}(\text{ParetoValues}_{\text{globalized}}); \\
\text{if} ((x_1 < 0) \text{ or } (x_2 < 0) \text{ and } (US\text{cost} > CA\text{Ncost})) \text{ then } x_2 := 0; x_1 := 'x_1'; C_1\text{diff} := \text{diff} (C_{\text{globalized}1} \cdot x_1); \text{ParetoValues}_{\text{globalized}} := \text{solve} ((C_1\text{diff} = 0, x_1 > 0, x_1 < 1), (x_1)); \text{assign}(\text{ParetoValues}_{\text{globalized}}); \\
\text{elif} (US\text{cost} < CA\text{Ncost}) \text{ then } x_1 := 0; x_2 := 'x_2'; C_2\text{diff} := \text{diff} (C_{\text{globalized}2} \cdot x_2); \text{ParetoValues}_{\text{globalized}} := \text{solve} ((C_2\text{diff} = 0, x_2 > 0, x_2 < 1), (x_2)); \text{assign}(\text{ParetoValues}_{\text{globalized}}); \\
\text{end if}; \\
x_1; \\
x_2; \\
x_1:p\text{aretoglobalized} := x_1; \\
x_2:p\text{aretoglobalized} := x_2;
\]

\[
C_{\text{globalized}} = x_1^2 + \frac{0.2 \cdot (-0.04785000000 \cdot x_1 + 0.0638)}{x_1 + x_2 + 0.2} + \frac{x_1 \cdot (-0.00007500000000 \cdot x_2 + 0.0001)}{x_1 + x_2 + 0.2} + x_2^2
\]

156
\[\frac{x I (-0.01605000000 \times 2 + 0.0214)}{x I + x^2 + 0.2} + 0.2 \frac{(-0.008250000000 \times I + 0.0110)}{x I + x^2 + 0.2}\]

\[UScost = 0.0467500000\]

\[CA4cost = 0.0134375000\]

\[x I := x I\]

\[x 2 := x 2\]

\[Ch1diff = 2 x I - \frac{0.2 (-0.0478500000 x I + 0.0638)}{(x I + x^2 + 0.2)^2} - \frac{0.0112200000}{x I + x^2 + 0.2} + \frac{-0.0000750000000 x I + 0.0001}{x I + x^2 + 0.2}\]

\[\frac{(-0.0160500000 x I + 0.0214)}{(x I + x^2 + 0.2)^2} + \frac{-0.0160500000 x I + 0.0214}{x I + x^2 + 0.2}\]

\[Ch2diff = \frac{-0.2 (-0.0478500000 x I + 0.0638)}{(x I + x^2 + 0.2)^2} - \frac{x I (-0.0000750000000 x I + 0.0001)}{(x I + x^2 + 0.2)^2} - \frac{-0.01612500000 x I}{x I + x^2 + 0.2}\]

\[+ 2 x^2 - \frac{x I (-0.0160500000 x I + 0.0214)}{(x I + x^2 + 0.2)^2} - \frac{0.2 (-0.00825000000 x I + 0.0110)}{(x I + x^2 + 0.2)^2}\]

\[ParetoValues_{globalized} = (x I = 0.05733117843, x 2 = 0.07254120909, (x I = -0.4220280595 + 0.8690366135 I, x 2 = 0.2149235386 - 0.8644264665 I), (x I = -0.1284206571 + 0.1092538207 I, x 2 = -0.1354573907 + 0.08478907885 I), (x I = -0.4220280595 - 0.8690366135 I, x 2 = 0.2149235386 + 0.8644264665 I))\]

\[x I_{pareto globalized} := 0.05733117843\]

\[x 2_{pareto globalized} := 0.07254120909\]
> \#reset x1, x2, x1 := 'x1'; x2 := 'x2';

> \#For the autarky case

> C_{\text{autarky}} := C_{1\text{autarky}} + C_{2\text{autarky}}

#test which country has the greater expected cost function

x1 := 0.5;

x2 := 0.5;

USCost := L1 + V2autarky;

CANCost := L2 + V1autarky;

x1 := 'x1'; x2 := 'x2';

C3diff := diff (C_{1\text{autarky}}, x1);

C4diff := diff (C_{2\text{autarky}}, x2);

ParetoValues_{\text{autarky}} := solve (C3diff = 0, C4diff = 0, (x1, x2));

assign (ParetoValues_{\text{autarky}}[1]);

if ((x1 < 0) or (x2 < 0)) and (USCost > CANCost) then x2 := 0; x1 := 'x1';

C3diff := diff (C_{1\text{autarky}}, x1);

ParetoValues_{\text{autarky}} := solve (C3diff = 0, x1 > 0, x1 < 1, (x1));

assign (ParetoValues_{\text{autarky}});

elseif (USCost < CANCost) then x1 := 0; x2 := 'x2';

C4diff := diff (C_{2\text{autarky}}, x2);

ParetoValues_{\text{autarky}} := solve (C4diff = 0, x2 > 0, x2 < 1, (x2));

assign (ParetoValues_{\text{autarky}});

end if;

x1 :=

x2 :=

x1paretoautarky := x1;

x2paretoautarky := x2;

\[
C_{\text{autarky}} = x1^2 + \frac{(x2 + 0.2)(-0.04785000000 \cdot x1 + 0.0638)}{x1 + x2 + 0.2} + x2^2 + \frac{x1 (-0.01605000000 \cdot x2 + 0.0214)}{x1 + x2 + 0.2}
\]

USCost = 0.03987500000

CANCost = 0.01337500000

x1 := x1

x2 := x2

158
\[ C^{\text{diff}} = 2 x I - \left( \frac{(x^2 + 0.2) (-0.04785000000 x I + 0.0638)}{(x I + x^2 + 0.2)^2} - \frac{0.04785000000 (x I + x^2 + 0.2)}{x I + x^2 + 0.2} \right) \\
+ \frac{-0.01605000000 x^2 + 0.0214}{x I + x^2 + 0.2} - \frac{x I (-0.01605000000 x^2 + 0.0214)}{(x I + x^2 + 0.2)^2} \]

\[ C^{\text{diff}} = \frac{-0.04785000000 x I + 0.0638}{x I + x^2 + 0.2} - \left( \frac{(x I + x^2 + 0.2)^2}{(x I + x^2 + 0.2)^2} \right) + 2 x I \\
- \frac{x I (-0.01605000000 x^2 + 0.0214)}{(x I + x^2 + 0.2)^2} - \frac{0.01605000000 x I}{x I + x^2 + 0.2} \]

\[ \text{ParetoValues}_{\text{auto}} = (x I = 0.03876601719, x^2 = -0.1834244113), (x I = 0.07187518362, x^2 = -0.01552453869), \]

\[ (x I = 0.6053452906, x^2 = -0.8190524933), (x I = -0.1733234785 + 0.0218761912 I, x^2 = -0.1076315456 - 0.1525092024 I), (x I = -0.1733234785 - 0.0218761912 I, x^2 = -0.1076315456 + 0.1525092024 I) \]

\[ x^2 := 0 \]

\[ x I := x I \]

\[ C^{\text{diff}} := 2 x I - \frac{0.2 (-0.04785000000 x I + 0.0638)}{(x I + 0.2)^2} + \frac{0.01183000000}{x I + 0.2} - \frac{0.0214 x I}{(x I + 0.2)^2} \]

\[ \text{ParetoValues}_{\text{auto}} = (x I = 0.0708452000) \]

\[ x I_{\text{paretoauto}} := 0.0708452000 \]

\[ x^2_{\text{paretoauto}} := 0 \]  \hspace{1cm} (21)

\#NASH EQUILIBRIUM VALUES#
Now we solve the NE values using both best response functions equalling zero.

FOR $P1_{public}g$ood

> #reset x1,x2 :='x1': x2 :='x2':

> #Calculate Nash Equilibrium values: Both $x1$ and $x2$ need to be positive and inbetween 0 and 1.
NEvalues := solve( [BR1_{globalized}$^\neq 0$, BR2_{globalized}$^\neq 0$, x1 < 1, x1 > 0, x2 < 1, x2 > 0], (x1, x2) );
assign(NEvalues)

\[ \text{NEvalues := \{ x1 = 0.0807758048355993, x2 = 0.0225965364475100 \}} \] (22)

> x1 :

> x2 :

> x1NE_{globalized} := x1; x2NE_{globalized} := x2 ;

\[ x1NE_{globalized} = 0.0807758048355993 \]

\[ x2NE_{globalized} = 0.0225965364475100 \] (23)

> #reset x1,x2 :='x1': x2 :='x2': FOR $P1_{reflection}$

> #Calculate Nash Equilibrium values: Both $x1$ and $x2$ need to be positive and inbetween 0 and 1.
NEvalues := solve( [BR1_{autarky}$^= 0$, BR2_{autarky}$^= 0$, x1 < 1, x1 > 0, x2 < 1, x2 > 0], (x1, x2) );
assign(NEvalues)

\[ \text{NEvalues := \{ x1 = 0.0873792257976734, x2 = 0.0126269601989958 \}} \] (24)

> x1 :

> x2 :

160
\[ x_{1} \text{NE}_{\text{autarky}} := x_1; \ x_{2} \text{NE}_{\text{autarky}} := x_2; \]

\[ x_{1} \text{NE}_{\text{autarky}} = 0.087392257976734 \]

\[ x_{2} \text{NE}_{\text{autarky}} = 0.0126269601989958 \]  
(25)

\[ \#\text{reset } x_1, x_2 \ x_1 := 'x_1'; \ x_2 := 'x_2'; \]

\#Plot

\[ \#\text{Plot Nash equilibrium with with best response functions and Pareto Efficient Allocation.} \]

\[ \text{NEglobalizedpoint} := \text{pointplot}([x_{1}\text{NE}_{\text{globalized}}, x_{2}\text{NE}_{\text{globalized}}], \text{colour}=\text{black}, \text{symbol}=\text{solidbox}, \text{symbolsize}=16, \text{legend}=\text{NE}) ; \]

\[ \text{NEautarky} := \text{pointplot}([x_{1}\text{NE}_{\text{autarky}}, x_{2}\text{NE}_{\text{autarky}}], \text{colour}=\text{black}, \text{symbol}=\text{solidcircle}, \text{symbolsize}=16, \text{legend}=\text{NE Autarky}) ; \]

\[ \text{Best1globalized} := \text{implicitplot}(\text{BR}_{1}\text{globalized}=0, x_1=0..0.15, x_2=0..0.15, \text{colour} = \text{grey}, \text{ linestyle} = \text{dash}, \text{legend} = \text{BR}_{\text{CS}}) ; \]

\[ \text{Best2globalized} := \text{implicitplot}(\text{BR}_{2}\text{globalized}=0, x_1=0..0.15, x_2=0..0.15, \text{colour} = \text{black}, \text{ linestyle} = \text{dash}, \text{legend} = \text{BR}_{\text{CAM}}) ; \]

\[ \text{Best1autarky} := \text{implicitplot}(\text{BR}_{1}\text{autarky}=0, x_1=0..0.15, x_2=0..0.15, \text{colour} = \text{grey}, \text{ linestyle} = \text{solid}, \text{legend} = \text{BR}_{\text{CS AUTARKY}}) ; \]

\[ \text{Best2autarky} := \text{implicitplot}(\text{BR}_{2}\text{autarky}=0, x_1=0..0.15, x_2=0..0.15, \text{colour} = \text{black}, \text{ linestyle} = \text{solid}, \text{legend} = \text{BR}_{\text{CAM AUTARKY}}) ; \]

\[ \text{PARETOfixedpoint} := \text{pointplot}([x_{1}\text{paretofixed}, x_{2}\text{paretofixed}], \text{symbol} = \text{box}, \text{symbolsize} = 16, \text{legend} = \text{Efficient Level}) ; \]

\[ \text{PARETOautarky} := \text{pointplot}([x_{1}\text{paretoautarky}, x_{2}\text{paretoautarky}], \text{symbol} = \text{circle}, \text{symbolsize} = 16, \text{legend} = \text{Autarky Efficient Level}) ; \]

\[ y := \text{plot}([x], x=0..0.15, \text{colour} = \text{black}, \text{ linestyle} = \text{dot}) ; \]

\[ \text{display}([\text{Best1globalized}, \text{Best2globalized}, \text{Best1autarky}, \text{Best2autarky}, y, \text{NEglobalizedpoint}, \text{NEautarky}, \text{PARETOfixedpoint}, \text{PARETOautarky}]) \]
Now we assume Country 2 (Canada) is following Country 1 (United States).

FOR P1: public good

x1 := x1'; x2 := x2';

Solve for x2 using the best response function of country 2.

\[
\text{STACKELBERGIbr} := \text{solve}(\{ BR_{2, \text{globalized}}(0), \{ x2 \} \}):
\]

assign(STACKELBERGIbr[1])

\[
x2 \left( 0.00166666666 \left( 2.199840 \times 10^6 x1 + 1.82800 \times 10^5 + 8.000000 \times 10^6 x1^3 + 5.666700 \times 10^6 x1^2 \\
+ 60. (3.144400 \times 10^6 + 1.493067056 \times 10^9 x1^2 + 1.89272640 \times 10^9 x1 + 8.030258025 \times 10^9 x1^4 \\
+ 4.893462960 \times 10^9 x1^3 + 3.852000000 \times 10^8 x1^5 )^{1/3} \right) - (600. ( -0.0044444444444 - 0.11111111111 x1^2 \\
- 0.04444444444 x1 ) / \left( 2.199840 \times 10^6 x1 + 1.82800 \times 10^5 + 8.000000 \times 10^6 x1^3 + 5.666700 \times 10^6 x1^2 \\
+ 60. (3.144400 \times 10^6 + 1.493067056 \times 10^9 x1^2 + 1.89272640 \times 10^9 x1 + 8.030258025 \times 10^9 x1^4 \\
+ 4.893462960 \times 10^9 x1^3 + 3.852000000 \times 10^8 x1^5 )^{1/3} \right) - 0.6666666667 x1 - 0.13333333333 ) \right)
\]
> #Recalculate the cost function of country 1 given the new x2 and differentiate Cl with respect to x1 to get the stackelberg best response from country 1 given the best response of country 2.

\[ C_1_{\text{globalized}} \]

\[ S'_{\text{globalized}} = \text{diff}(C_1_{\text{globalized}, x1}) \]

> #Solve for x1. x1 must be between 0 and 1. \( \text{answer 1} := \text{fsolve}\left( \left\{ S'_{\text{globalized}} = 0 \right\}, (x1) \right) \);

\[ \text{answer 1} := \left\{ x1 = 0.08040108228 \right\} \quad (27) \]

\[ ( ) \left\{ 0.08040108228 = 0.08040108228 \right\} \]

> assign(answer 1[1]) \text{answer 1}

\[ \left\{ \right\} \]

> #Solve for x2 using x1. x1 : x2 :

\[ x1S'_{\text{globalized}} = x1 \]

\[ x1S'_{\text{globalized}} = 0.08040108228 \]

\[ (29) \]

> x2S'_{\text{globalized}} = x2

\[ x2S'_{\text{globalized}} = 0.0225998340 \]

\[ (30) \]

\[ \text{Reset x1, x2. } x1 := 'x1'; x2 := 'x2'; \]

\[ \text{Reset x1, x2. } x1 := 'x1'; x2 := 'x2'; \]
> #For Picnic

> #Solve for \( x_2 \) using the best response function of country 2.

> \[ \text{STACKELBERG}_2 \Rightarrow \text{solve} \left( \begin{array}{l}
\text{BR}_2_{\text{autarky}} = 0, \\
(x_2)
\end{array} \right) \]

> assign(\text{STACKELBERG}_2[1])

> \( x_2 \)

\[
\left( \begin{array}{c}
0.001666666667 \left( 2.28894 \times 10^6 x_1 + 64000 + 8.000000 \times 10^6 x_1^3 + 5.666700 \times 10^6 x_1^2 \\
+ 60
\end{array} \right)
\]

\[
(1.230162201 \times 10^9 x_1^3 + 4.7251200 \times 10^9 x_1^2 + 8.426258025 \times 10^9 x_1 + 4.645964610 \times 10^9 x_1^3 \\
+ 3.852000000 \times 10^9 x_1^2) \sqrt[1/3]{-\text{\small (600. \ (-0.004444444444444 - 0.111111111111111111x_i - 0.04444444444444444444x_i))}}
\]

\[
\left( 2.28894 \times 10^6 x_1 + 64000 + 8.000000 \times 10^6 x_1^3 + 5.666700 \times 10^6 x_1^2 \\
+ 60
\right)
\]

\[
(1.230162201 \times 10^9 x_1^3 + 4.7251200 \times 10^9 x_1^2 + 8.426258025 \times 10^9 x_1 + 4.645964610 \times 10^9 x_1^3 \\
+ 3.852000000 \times 10^9 x_1^2) \sqrt[1/3]{-0.6666666667 x_i - 0.1333333333}
\]

> #Recalculate the cost function of country 1 given the new \( x_2 \) and differentiate \( C_1 \) with respect to \( x_1 \) to get the stackelberg best response from country 1 given the best response of country 2.

> \[ \text{\text{C1}}_{\text{autarky}} \]

> \[ \text{\text{S1}_{\text{autarky}}} = \text{diff} \left( \text{\text{C1}}_{\text{autarky}} \times x_1 \right) \]

> #Solve for \( x_1 \). \( x_1 \) must be between 0 and 1. \( \text{answer2} := \text{fsolve} \left( \left( \text{\text{S1}_{\text{autarky}}} = 0 \right) \left( x_1 \right) \right) \); assign(\text{answer2}[1]); answer2

\[ \text{answer2} := (x_1 = 0.08622275235) \]

\[
\left( \begin{array}{c}
0.08622275235 = 0.08622275235
\end{array} \right)
\]

> #Solve for \( x_2 \) using \( x_1 \).

> \[ x_1 \text{\text{S1}_{\text{autarky}}} = x_1 \]

164
\[ x_{\text{US}} = 0.08622275235 \]  \hspace{1cm} (33)

\[ x_{2\text{US}} = x_2 \]

\[ x_{2\text{CA}} = 0.0125536584 \]  \hspace{1cm} (34)

\[ \#\text{reset } x_1, x_2. \; x_1 := \text{"x1"}; \; x_2 := \text{"x2"}; \]

\[ \#\text{ALL FINAL RESULTS#} \]

<table>
<thead>
<tr>
<th>FINAL RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>AUTARKY</td>
</tr>
<tr>
<td>Non-Cooperative</td>
</tr>
<tr>
<td>Fully-Cooperative</td>
</tr>
<tr>
<td>Leader-Follower</td>
</tr>
<tr>
<td>Globalized</td>
</tr>
<tr>
<td>Non-Cooperative</td>
</tr>
<tr>
<td>Fully-Cooperative</td>
</tr>
<tr>
<td>Leader-Follower</td>
</tr>
</tbody>
</table>

165